BARNHILL

SEARLE LABORATORIES

MODEL 6401

Programmable Counter–Timer

(PREFIX 500)

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Beckman

Operating and Servicing Manual

Electronic Instruments Division

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E682079-468-31P

PRINTED IN U. S. A.

BII No. 015-437146

LOT 1, SERIAL 101-125.
LOT 2, SERIAL 126-225.

MODEL 6401

Programmable Counter–Timer

(PREFIX 500)

Beckman
INSTRUMENTS, INC.
ELECTRONIC INSTRUMENTS DIVISION
RICHMOND, CALIFORNIA • 94804

JANUARY 1970

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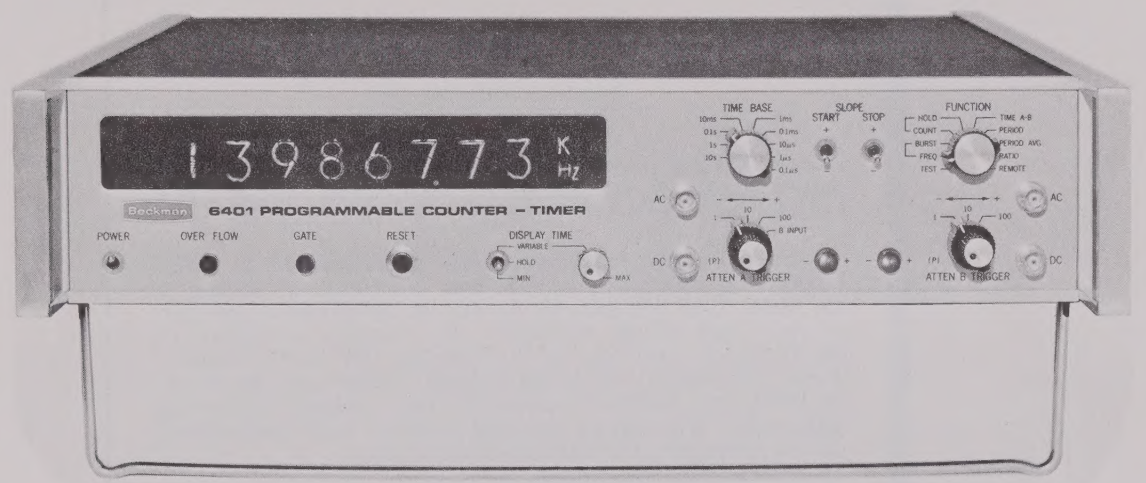

Model 6401 Programmable Counter-Timer

Frontispiece

MANUAL REVISIONS

Beckman Instruments is continually striving to provide better quality in its products. As a result, changes are initiated to improve performance and specifications.

Several changes may have been incorporated in your instrument since the manual was last printed. If this is the case, may we impose on you to make these changes to your copy of the manual? All changes are given in the form of addenda, one addendum for each change. They are printed on green-colored paper and inserted, in letter or number sequence, immediately following this page. If a change does not apply to your instrument, please disregard the associated addendum.

PREFIX NUMBERS

The prefix number denotes a generation of manuals. All addenda for a certain prefix number are incorporated in the manual before reprinting and the number increased by one (e.g., "Prefix 500" becomes "Prefix 501").

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SECTION 1
GENERAL

INTRODUCTION

The Beckman Model 6401 Programmable Counter and Timer measures frequency, period, multiple period, time interval, and frequency ratio through a frequency range of 0 to 136 MHz. The unit provides eight digits of inline numerical readout with automatically positioned decimal point and legend information. Additional features include remote programming of front-panel controls, BCD storage, BCD outputs, and trigger level monitor lamps. The unit is constructed primarily of integrated circuits, all of which are mounted in sockets for ease of troubleshooting and repair.

The counter will accept a wide range of inputs. Three attenuator positions, AC-DC coupling and trigger level adjustments are provided for both input channels. The individual selection of start and stop slope polarity is provided for time interval and period measurements.

SPECIFICATIONS

Specifications for the Model 6401 are given in Table 1-1.

Table 1-1. Model 6401 Specifications

Input Characteristics (A and B Channels)	Attenuation Factors:	1	10	100
	Sensitivity (rms)	0.1 V	1.0 V	10 V
	Resistance (dc)	1.0 MΩ	1.0 MΩ	1.0 MΩ
	Trigger Level	±1.0 V	±10 V	±100 V
	DC Overload	150 V	500 V	500 V
	DC Blocking	500 V	500 V	500 V
Coupling	AC or DC.			
Input Capacitance	Input resistance shunted by less than 25 pf.			
Trigger Slopes	Positive or negative for start and stop.			
Internal Reference Frequency	10 MHz.			
Time Base Stability	Aging Rate: 1 part in 10^6 per year, or better. Stability Temperature: 20 parts in 10^6 from 0^oC to 50^oC. Line Voltage: 1 part in 10^7 for ±10% line voltage change.			

continued. . .

Table 1-1. Model 6401 Specifications - continued

Accuracy	a) Frequency: ±1 count ± oscillator stability. b) Single Period: ±1 count ± oscillator stability ± trigger error. c) Multiple Period: ±1 count ± oscillator stability ± $\frac{\text{trigger error}}{\text{periods averaged}}$. For 0.1 V rms sine wave with a signal-to-noise ratio 40 dB. Trigger error ≤ 0.3% of one period.
Display	a) Eight in-line digits are displayed on numerical glow tubes. Display includes automatically-positioned decimal point. The legend displayed is KHz and MHz for frequency measurements, and μs, ms, s, and Ks for time interval measurements. b) Storage On: Display is updated at the completion of a measurement. c) Storage Off: Display follows the counting process.
Display Time (Minimum time between measurements)	Continuously variable from 0.1 to 10 sec. in VARIABLE mode. Nominal 25 μsec. in MIN mode and infinite in HOLD mode.
Coded Output	a) Four-line, 1-2-4-8 BCD output at rear panel (Amphenol 40500, 50-pin connector). Binary 0 is 0 V to +0.5 V, binary 1 is +4 V to +5 V. b) Data is available from buffer storage in all modes except Count or Storage Off in which the data is continuously updated. c) Print command is a logical 1 with a nominal 10 μsec duration.
Auxiliary Inputs	a) External Reference: Accepts external frequencies of 1, 2.5, or 5 MHz as a substitute for internal reference; 1000Ω input resistance. Voltage requirements at each frequency are: 1 MHz - from 0.5 V p-p to 6 V p-p. 2.5 MHz - from 0.5 V p-p to 6 V p-p. 5 MHz - from 0.5 V p-p to 1 V p-p. b) Inhibit: Contact closure to ground or logic 0 which must occur before end of print command. Logic 0 is 0 V to +0.5 V. c) Reset: Contact closure to ground or 0 V to +0.25 V, logic 0. 1 μsec minimum pulse duration.
Auxiliary Outputs	Oscillator Output: 1 MHz sine wave at ≥ 1 V rms from 1000Ω source. Time Base Output: Logic 1 for a duration of 100 ns from a 300Ω source. Logic 0 is 0 V to +0.5 V; logic 1 is +3.5 V to +5 V. Gate Marker Output: A negative pulse, 400 ns ±50% duration at 50% amplitude. Logic 0 is +15 V with a 2.7 K nominal source resistance. Logic 1 is a saturated transistor with 0 to +0.5 V with a load current of 10 mA or less. The gate marker outputs are suitable for intensity modulation of standard laboratory oscilloscopes.

continued. . .

Table 1-1. Model 6401 Specifications - continued

Power	115 V or 230 V (selectable at rear panel). 50 to 60 Hz. 63 Watts maximum.
Temperature	Operating: 0 to +55°C. Storage: -55°C to +75°C.
Weight	20 pounds.
Dimensions	3.5 in high; 17 in. wide; 18.5 in. deep.

THEORY OF OPERATION

A simplified block diagram of the Model 6401 Programmable Counter and Timer is shown in Figure 1-1.

The functional control section is the heart of the system. It takes the program data from the front-panel controls, or the remote program inputs, and produces the logic control signals which route the A channel, B channel, and reference frequency through the system to perform the program. It also produces the logic control signals which select the proper legend and decimal display for the program selected. The routing of the channel input data and the reference frequency is determined by the function selected.

FUNCTIONS

Following is a description of the functions selectable by the front-panel controls or remote program.

TEST Mode

The TEST mode is performed by routing the reference frequency to the time base divider and to the gate. The time base divider divides the reference frequency by 10^0 to 10^8, determined by the front-panel TIME BASE selector switch or remote program. The displayed function is:

10^n counts, where n = 0 to 8 determined by the time base selected.

$$\frac{\text{Input Frequency}}{\text{Reference Frequency}} \times 10^n \text{ counts,}$$

where n is determined by the TIME BASE selector switch or remote program.

The channel output routed to the gate is selected by the A channel attenuator switch on the front panel or by remote program.

FREQ Mode

The FREQ mode is performed in the same manner as the TEST mode, except that the output of the shaper from one of the input channels is routed to the gate in place of the reference frequency. The displayed function is:

$$\frac{\text{Input Frequency}}{\text{Reference Frequency}} \times 10^n \text{ counts,}$$

where n is determined by the TIME BASE selector switch or remote program.

The channel output routed to the gate is selected by the A channel attenuator switch on the front panel or by remote program.

BURST Mode

The BURST mode is performed in the same manner as the FREQ mode with the exception that the time base divider is disabled until the envelope of a carrier frequency is detected on

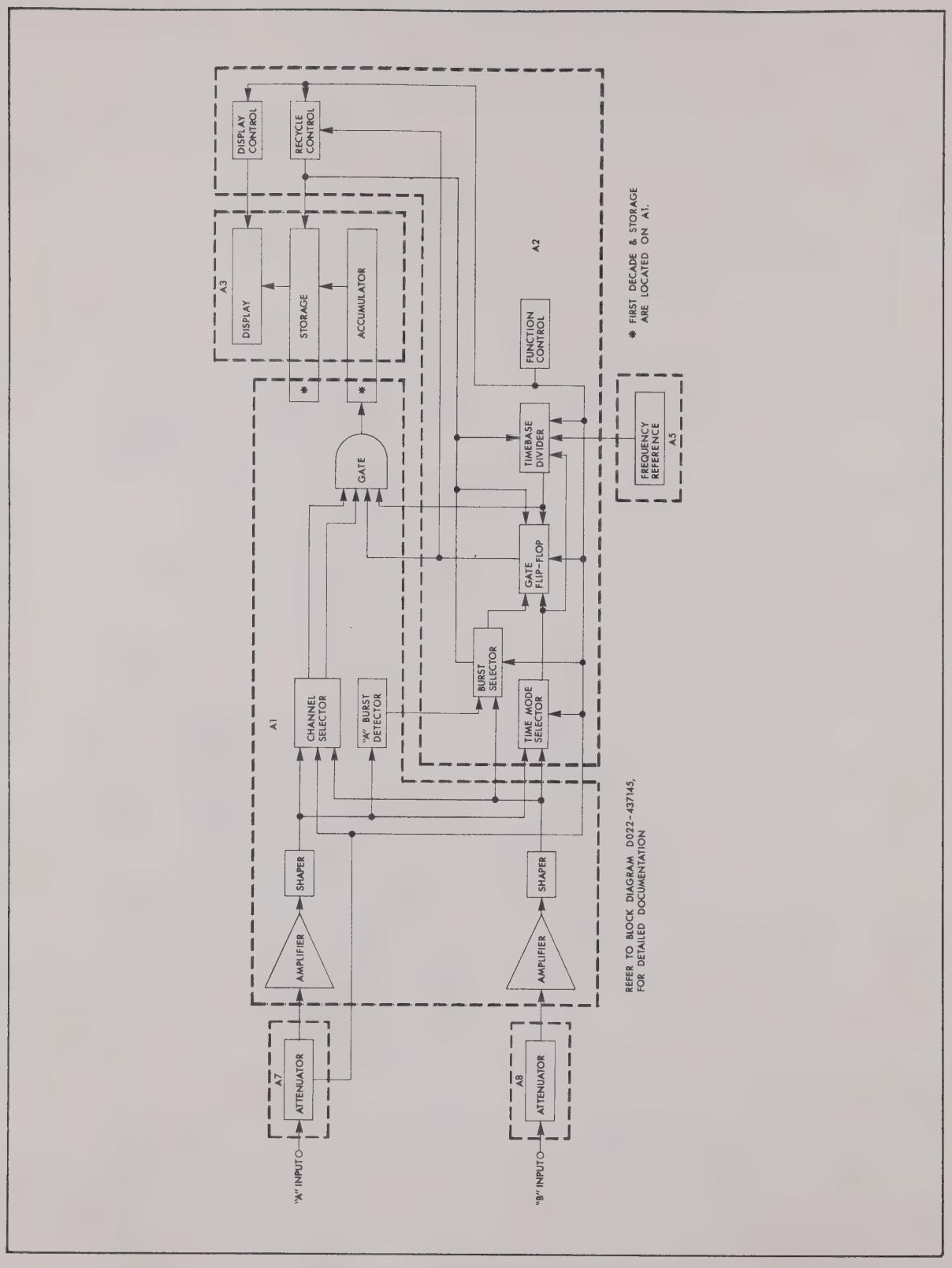


Figure 1-1. Model 6401 Simplified Block Diagram

the selected channel and the Burst control enabled. This synchronizes the gate with the leading edge of a pulse modulated carrier, etc. Channel selection is accomplished with the A channel ATTEN switch or by remote program.

COUNT-HOLD Modes

The COUNT-HOLD functions are used for straight accumulation of events. The storage is disabled, and the shaper from the selected channel is routed to the gate. The gate is controlled by the selection of COUNT or HOLD. A reset is obtained only by manual or remote reset command. Channel selection is accomplished with the A channel ATTEN switch or by remote program.

TIM A→B (Time Interval Measurement)

This mode programs the time mode selector circuits to route the A channel shaper to initiate counting by closing the gate; and the B channel shaper to terminate the counting by opening the gate. The reference frequency is routed to the time base divider where it is divided by 10^0 to 10^8. The output of the time base divider is routed to the gate to be counted for the gate duration. The resolution of the measurement is:

$$\frac{10^n}{\text{Reference Frequency}}$$

where n is determined by the TIME BASE selector switch or remote program.

PERIOD Mode

This mode is the same as TIM A→B, except that the time mode selector circuits route only the selected input channel to control the gate; i.e., with channel A selected, the channel A shaper will control both the closing and opening of the gate. The input channel is selected by the A channel attenuator switch or remote program.

PERIOD AVG Mode

This function is the same as PERIOD except the resolution is fixed at (Reference Frequency)$^{-1}$, and the gate closing function is routed to the time base divider in addition to the gate flip-flop. The time base divider inhibits the gate opening function until 10^0 to 10^8 gate closing functions have occurred. The factor 0 to 8 is determined by the TIME BASE selector switch or remote program.

RATIO Mode

This mode is a combination of frequency A channel and period average B channel. The A channel shaper output is routed to the gate. The B channel shaper is selected to control the gate as described under "PERIOD AVG Mode". The displayed function is:

$$\frac{\text{Frequency Channel A}}{\text{Frequency Channel B}} \times 10^n$$

where n is 0 to 8 determined by the TIME BASE selector switch or remote program.

Recycle

The recycle system provides a control over the time between readings and generates the storage and reset commands to recycle the system.

CONNECTORS

Pin numbers for the Digital Recorder connector are given in Table 1-2. Pin numbers for the Remote connector are given in Table 1-3.

Table 1-2. Digital Recorder Connector Pin Numbers

Pin No.	Decimal Digit	Binary Weight	Pin No.	Decimal Digit	Binary Weight
1	1	1	26	5	4
2	1	2	27	5	8
3	1	4	28	6	1
4	1	8	29	6	2
5	2	1	30	6	4
6	2	2	31	6	8
7	2	4	32	7	1
8	2	8	33	7	2
9	3	1	34	7	4
10	3	2	35	7	8
11	3	4	36	8	1
12	3	8	37	8	2
13	4	1	38	8	4
14	4	2	39	8	8
15	4	4	40	8	1] Ninth Digit Option
16	4	8	41	9	2
17	5	1	42	9	4
18	5	2	43	9	8]
19	Accessory Command		44		
20	Ground		45		
21			46		
22			47		
23			48		
24			49		
25			50		

Table 1-3. Remote Connector Pin Numbers

UNLESS OTHERWISE NOTED:

Logic LO: -0.5 V to +0.25 V. Input Load: 7 DTL gate circuits. (Typical current sink required is 12 mA.)

Logic HI: +3.5 V to +12 V.

Pin No.	Selected Mode		Characteristics
5	10 s]		HI: No time base selected.
6	1 s		
7	0.1 s		LO: Any one input LO will select the respective time base. If more than one input is LO, the fastest time base will occur.
8	10 ms	TIME BASE	
9	1 ms		
10	0.1 ms		
11	10 μs		
12	1 μs		
13	0.1 μs]		

continued. . .

Table 1-3. Remote Connector Pin Numbers - continued

Pin No.	Selected Mode	Characteristics
22 23 24 27 34 35 36	TEST FREQ BURST TIM A→B RATIO PER AVG PERIOD] FUNCTION	HI: No function selected. LO: Any one input low will select the respective function. More than one input LO will result in an indeterminate function.
25 26	COUNT HOLD	HI: Counter gate remains in previously selected state. LO: For greater than or equal to 500 ns will switch the gate to the selected state. Selecting both inputs will place the gate in the hold state.
31 32	START STOP] SLOPE	HI: Negative slope. LO: Selected slope is positive.
33	B Enable	HI: A input is connected to count chain. LO: A input is not used and B input is connected to count chain.
21	Fast Display	HI: Display time is controlled by front-panel controls of HOLD-VARIABLE-MIN and DISPLAY TIME. (Also, see remote display rate, pins 17 and 18.) LO: Display time fixed at 25 μs nominal.
17 18	Display Rate	Resistance: When the front-panel HOLD-VARIABLE-MIN switch is placed in the HOLD position, the display time can be controlled externally by placing a 500 KΩ variable resistor across pins 17 and 18. When 500 KΩ, display time is 10 seconds nominal. When 0 Ω, display time is 100 ms nominal. If external resistor is applied, it will affect the control range of the front-panel control reducing the 10 s maximum time when not in REMOTE mode.
20	RESET	HI: No effect. LO: For greater than or equal to 1 μs will reset the counter function and data storage. Counter will not be released to take a new count until returned to HI.
19	Ground	Logic Ground: May be used as reference point or source of LO signals, or program return point if program inhibit is not desired.
14	Ground, Remote Function	Output - HI: When front-panel FUNCTION switch is in any position other than REMOTE. LO: When in REMOTE position. Provides remote program inhibit when not in REMOTE mode. Load is a switch to ground for LO and 1KΩ to +5V for HI.
15 16	A B] Trigger Level	Analog: Input points for trigger level voltages. A ±15 V dc voltage will vary the trigger level greater than ±1 V x Attenuator setting on the front-panel control. The front panel trigger level control must be in the preset position, otherwise excessive loading will result depending upon the front panel trigger level pot position. Load resistance is 3KΩ when in preset position.

SECTION 2
DIAGRAMS & PARTS LISTS

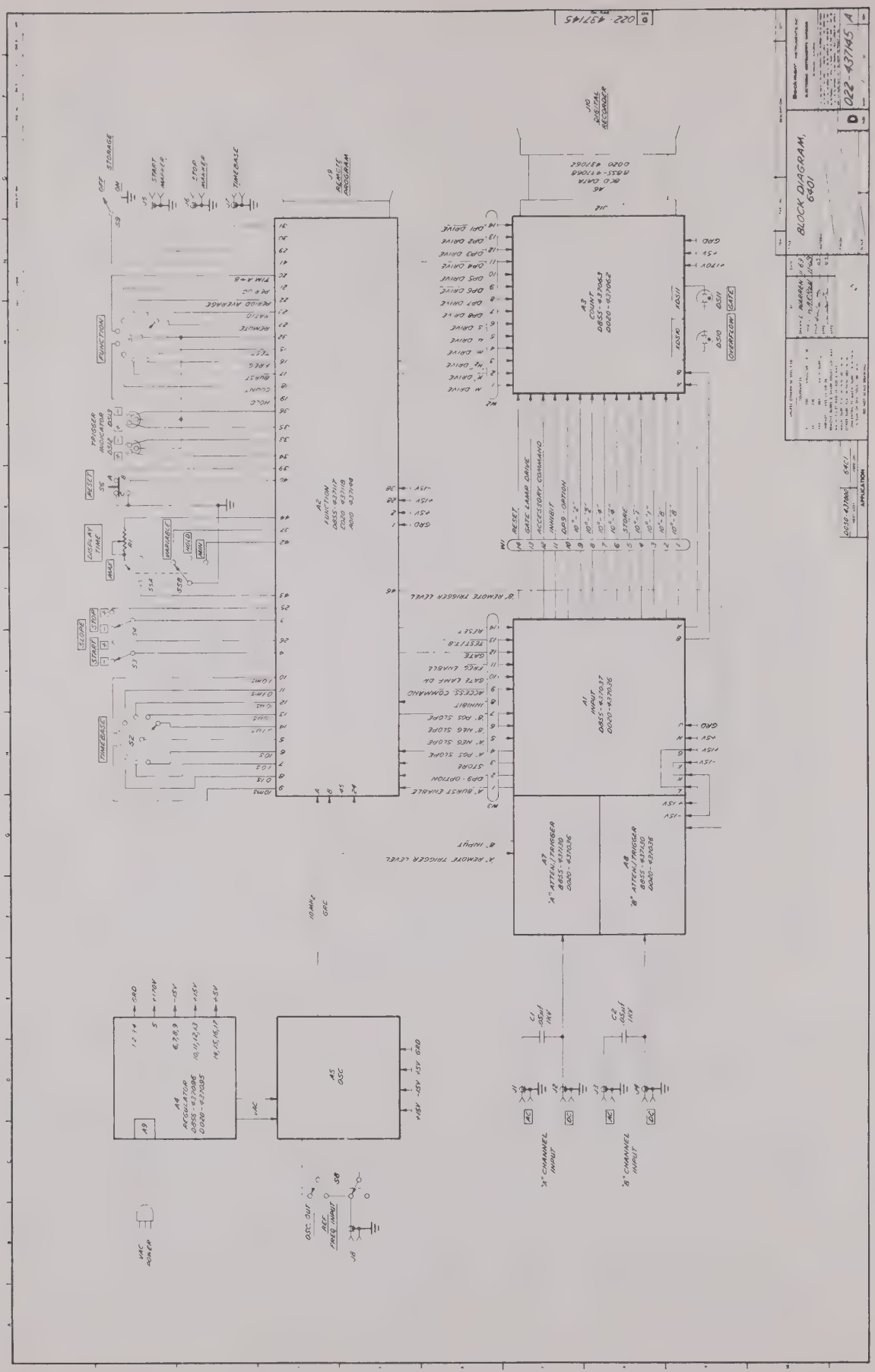
INTRODUCTION

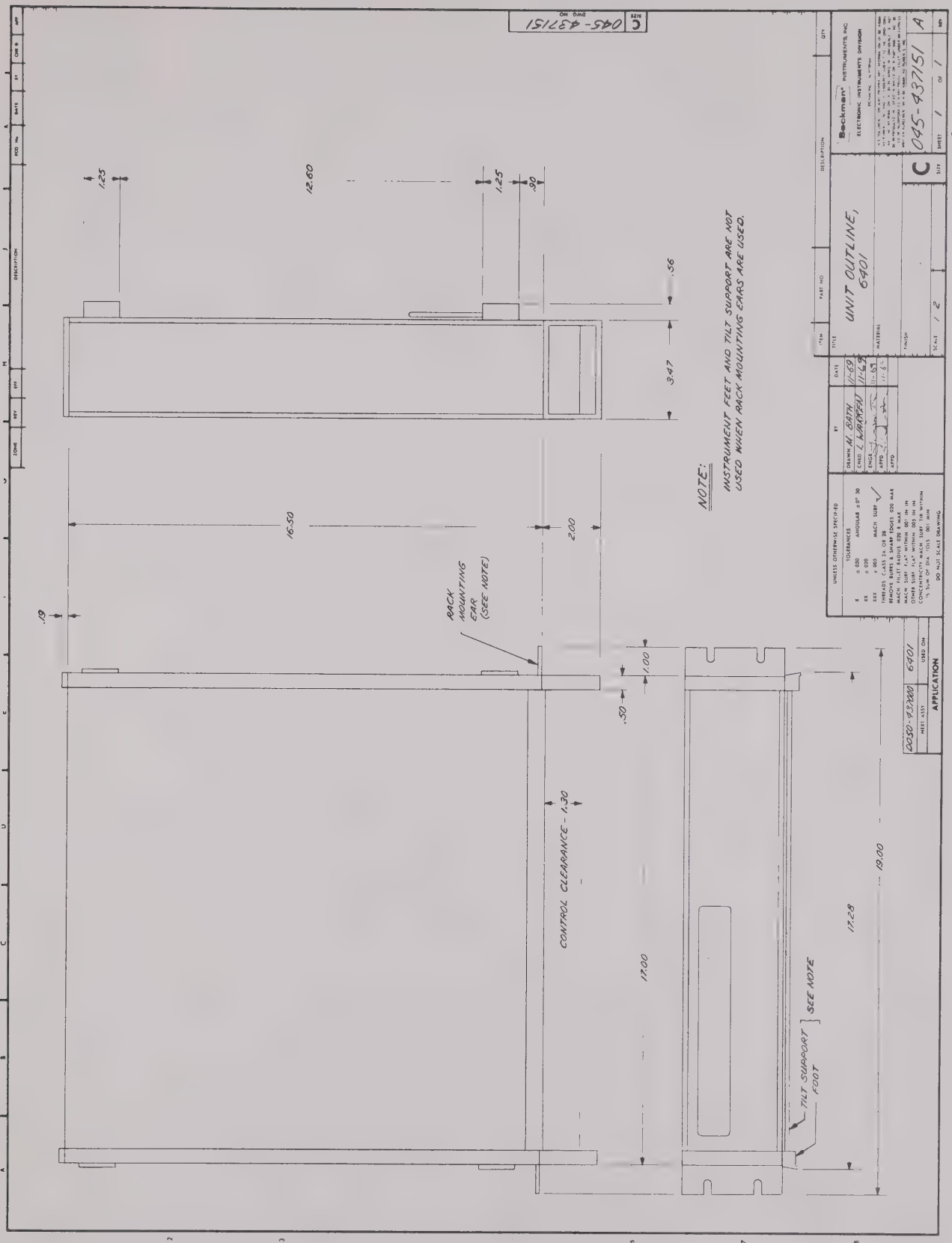
This section contains diagrams and parts lists pertinent to the Model 6401. Parts lists for individual assemblies are located near or with their respective component layout drawings and schematic diagrams. Table 2-1 lists the drawings and parts lists and their respective page numbers.

Table 2-1. Diagrams and Parts Lists

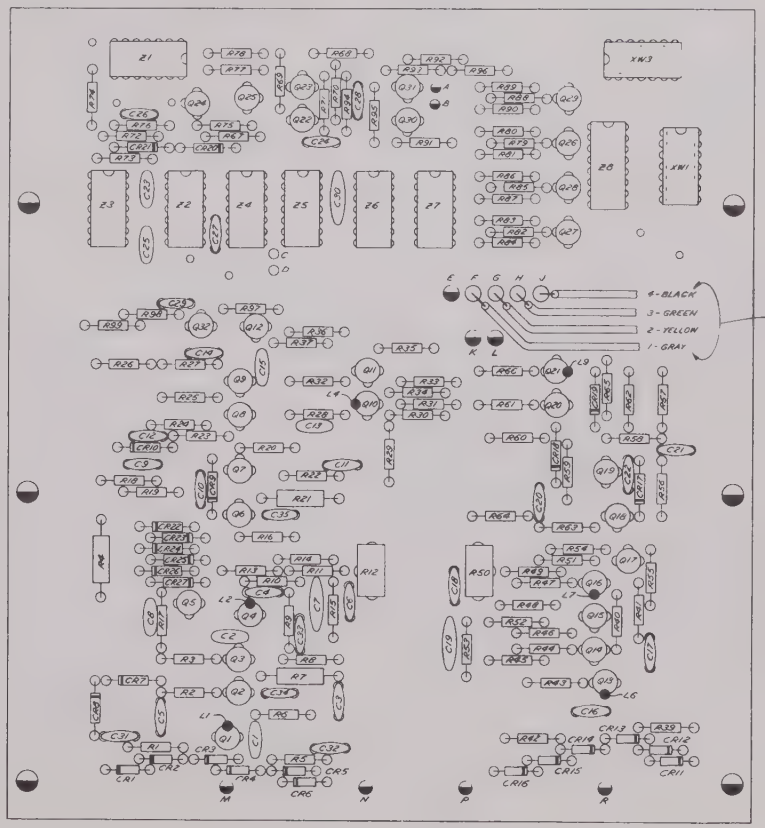
Description	Dwg. No.	Page
Block Diagram	D-437145-A	2-2
Outline Drawing	C-437151-A	2-3
Input Board Assembly Diagram (A1)	D-437037-B	2-4
Input Board Assembly Parts List		2-5
Input Board Schematic Diagram (A1, A7, A8) Page 1 of 2	D-437036-B	2-7
Input Board Schematic Diagram (A1, A7, A8) Page 2 of 2	D-437036-B	2-8
Function Board Assembly Diagram (A2)	D-437117-B	2-9
Function Board Assembly Parts List		2-10
Function Board Schematic Diagram	E-437118-B	2-11
Count Board Assembly Diagram (A3)	D-437063-C	2-13
Count Board Assembly Parts List		2-14
Count Board Schematic Diagram	D-437062-C	2-15
Regulator Board Assembly Diagram (A4)	D-437096-B	2-16
Regulator Board Assembly Parts List		2-17
Regulator Board Schematic Diagram	D-437095-B	2-19
Atten/Trigger Switch Assembly Diagram (A7, A8) w/Parts List	B-437130-A	2-20
Front Panel Mechanical & Wired Assembly Diagram	C-437126-A	2-21
Rear Panel Mechanical & Wired Assembly Diagram	C-437133-A	2-22
Parts Lists: Front Panel Mechanical & Wired Assembly) Rear Panel Mechanical & Wired Assembly) Mechanical & Wired Assembly)		2-23
Mechanical & Wired Assembly Diagram	D-437142-A	2-24
Multiplier Board Assembly Diagram (used w/Timing Module)	C-437136-A	2-25
Multiplier Board Assembly Parts List		2-26
AA Timing Module Assembly Diagram	C-435640-C	2-27
AA Timing Module Assembly Parts List		2-28
Timing Module Assembly Diagram w/Parts List	A-437135-A	2-28
Timing Module Logic Diagram (A5)	C-437137-A	2-29
AA - 1 MHz Oscillator Board Assembly Diagram w/Parts List	B-435440-A	2-30
AA - 1 MHz Oscillator Schematic Diagram	B-435427-B	2-31

Note: BCD Board (A6) takes connector, Beckman Part No. 672-814649.


BLOCK DIAGRAM, 6401
022-437145 A
A1 INPUT
A2 FUNCTION
A3 COUNT
A4 REGULATOR
A5 OSC
A6 DISPLAY
A7 "A" ATTEN/TRIGGER
A8 "B" ATTEN/TRIGGER
"A" CHANNEL INPUT
"B" CHANNEL INPUT
TRIGGER INDICATOR
DISPLAY TIME
TIMEBASE
FUNCTION
REMOTE PROGRAM
REMOTE RECORDER
OVERFLOW GATE
OSC OUT
REF FREQ INPUT
LINE POWER


12.60
1.25
1.25
.30
.56
.347
16.50
2.00
.19
RACK MOUNTING EAR (SEE NOTE)
1.00
.50
CONTROL CLEARANCE - 1.30
17.00
17.28
19.00
TILT SUPPORT FOOT
SEE NOTE
NOTE:
INSTRUMENT FEET AND TILT SUPPORT ARE NOT USED WHEN RACK MOUNTING EARS ARE USED.
UNIT OUTLINE, 6401
Beckman® INSTRUMENTS, INC.
ELECTRONIC INSTRUMENTS DIVISION
C 045-937151 A
SCALE 1/2
SHEET 1 OF 1
DRAWN M. BATH 11-69
CHKD L. WARREN 11-69
ENGR 11-69
APPD 11-69
APPD
UNLESS OTHERWISE SPECIFIED
TOLERANCES
X ± .030 ANGULAR ± 0° 30'
XX ± .010
XXX ± .005 MACH SURF
THREADS CLASS 2A OR 2B
BREAK BURRS & SHARP EDGES .020 MAX
MACH SURF FLAT WITHIN .001 IN IN
OTHER SURF FLAT WITHIN .005 IN IN
CONCENTRICITY MACH SURF TIR WITHIN
1/4 SUM OF DIA TOLS .001 MIN
DO NOT SCALE DRAWING
0230-93380 6401
NEXT ASSY USED ON
APPLICATION

B | COMPONENT RELAYOUT | 12288 12-69 | L.W.



NOTES.

1. ● - INDICATES FERRITE BEAD ON TRANSISTOR LEAD
2. ◒ - INDICATES HOLES TO BE MASKED PRIOR TO SOLDERING.
3. Z1-Z8 ARE SOCKET MOUNTED
4. SPECIAL PREPARATION REQUIRED FOR CR1,2,3,4,5,6,11,12,13,14,15,16 NON-STANDARD SPACING
5. INSERT WIRES PRIOR TO SOLDERING OPERATION WIRE LIST A039-437127
6. L1,L2,L6 & L7 MUST BE INSULATED TO PREVENT THEM FROM TOUCHING ADJACENT TRANSISTOR LEADS
   TYPICAL FOR 4 LEADED TRANSISTORS; REMOVE LEAD SHOWN:

D 855-437037

2	0020-437038	SCHEMATIC INPUT BOARD	REF.
1	A037-437038	PARTS LIST, INPUT BD.	1
ITEM	PART NO	DESCRIPTION	QTY

855-437192	6401		
NEXT ASSY	USED ON		
APPLICATION			

DO NOT SCALE DRAWING

K Shinada 12/69

P.C BOARD ASSY, INPUT-A1

SCALE 2:1

D

855-437037 B

SHEET 1 OF 1

INPUT BOARD ASSEMBLY (A1) - PARTS LIST

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
	D-437037-B	Input Board (A1)	Beckman	
C1, 25	637-822251	Capacitor, F. Mica, 100pf, 500V, 5%	*DM15-F101J0-WV4CR	2
C2, 13, 26	637-825071	Capacitor, F. Mica, 27pf, 500V, 5%	DM15-E270J0-WV4CR	3
C3, 5, 6, 9, 10, 11, 12, 14, 17, 18, 20, 21, 22, 24, 28, 29, 31, 32, 33	633-836864	Capacitor, F. Cerm., 0.01μf, 100V	Sprague C023B101F-103M	19
C4, 16, 27	633-857571	Capacitor, F. Cerm., 47pf	Sprague 5GA-Q47	3
C7, 19, 30	633-815873	Capacitor, F. Cerm., 0.33μf, 25V	Sprague 5C023334D-8250B3	3
C8, 23, 35	637-825069	Capacitor, F. Mica, 10pf, 500V, 5%	DM15-C100J0-WV4CR	3
C15, 34	637-857581	Capacitor, F. Mica, 6pf, 500V, 5%	DM15-C060D0-WV4CR	2
CR1, 2, 3, 4, 5, 6, 7, 11, 12. 13, 14, 15, 16, 20 thru 27	755-838731	Diode, 1N4448	Continental Devices	21
CR8, 18	755-832774	Diode, Zener, 8.2V, 5%, 1N756A	Motorola	2
CR9	755-814019	Diode, Zener, 6.8V, 5%, 1N754A	Motorola	1
CR10	755-818496	Diode, Zener, 5.1V, 5%, 1N751A	Motorola	1
CR17	755-822858	Diode, Zener, 6.2V, 5%, 1N753A	Continental Devices	1
CR19	755-836043	Diode, Zener, 12.0V, 5%, 1N759A	Motorola	1
L1, 2, 4, 6, 7, 9	783-807862	Ferrite Bead	Ferroxcube 56-590-65/3B	6
Q1 & Q4, Q13 & Q16	755-857548	Transistor, Matched Pair	Tex. Instr. TIS69	2 pr.
Q2, 3	755-857328	Transistor, 40235	RCA	2
Q5, 8, 9, 12, 17, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32	755-845089	Transistor, 2N4258	Fairchild	15
Q6, 7	755-857419	Transistor, 2N5179	RCA	2
Q10, 11, 14, 15, 18, 19, 20, 21, 24	755-857274	Transistor, 2N4275	Fairchild	9
R1, 5, 39, 42, 45	601-822295	Resistor, 2.7K, 1/4W, 5%	**A. B. CB2725	5
R2, 3, 10, 56, 58, 69, 73, 76, 81, 84, 87, 90	601-823394	Resistor, 330Ω, 1/4W, 5%	A. B. CB3315	12
R4	601-015442	Resistor, 150Ω, 1/2W, 5%	A. B. EB1515	1
R6, 9, 43, 47	601-823902	Resistor, 47K, 1/4W, 5%	A. B. CB4735	4
R7, 21	601-008129	Resistor, 1.5K, 1/2W, 5%	A. B. EB1525	2
R8, 20, 64	601-817735	Resistor, 100Ω, 1/4W, 5%	A. B. CB1015	3
R11	601-823397	Resistor, 5.6K, 1/4W, 5%	A. B. CB5625	1

continued. . .

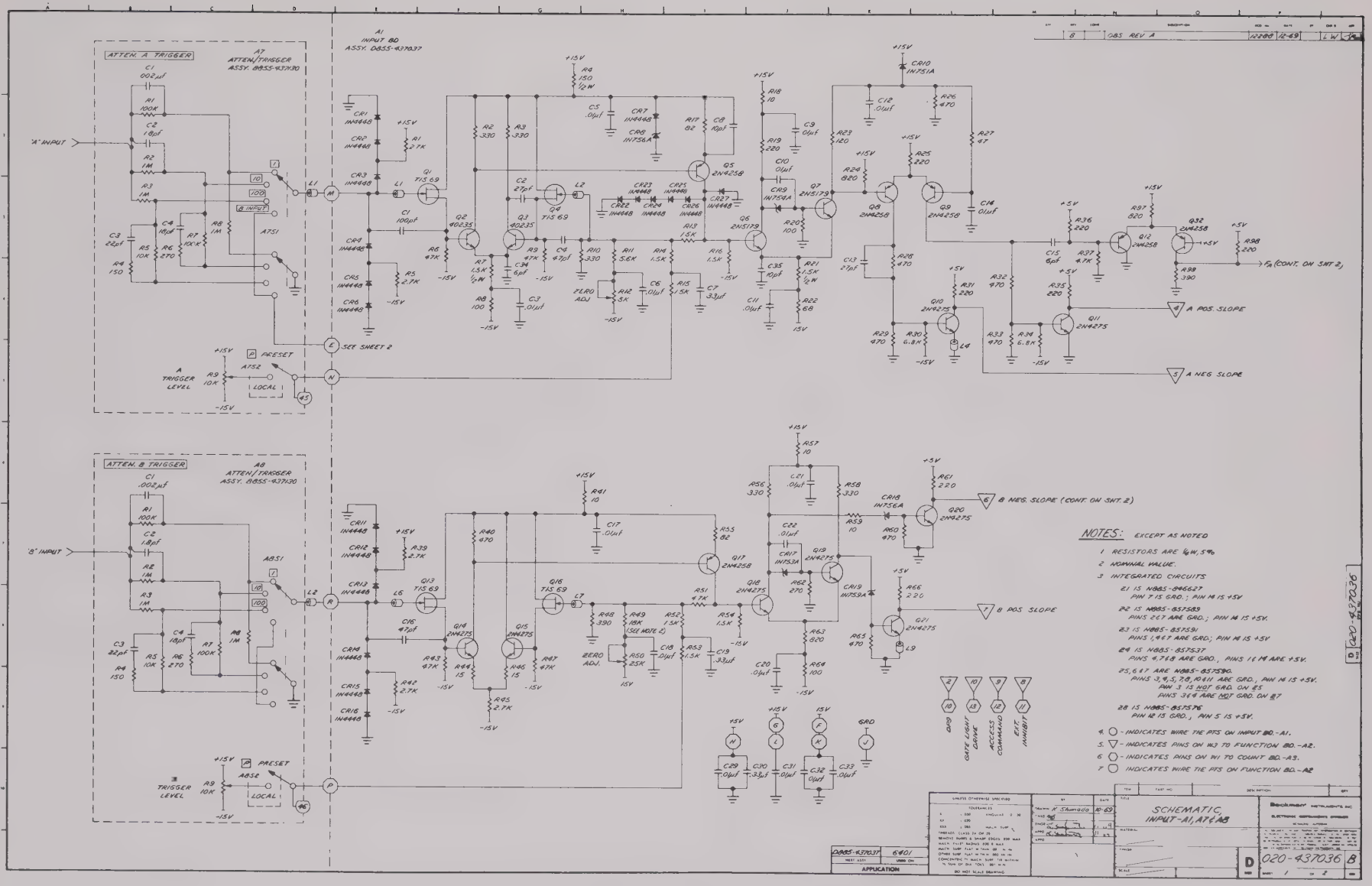
*"DM15. . . . WV4CR" are Electromotive capacitors.

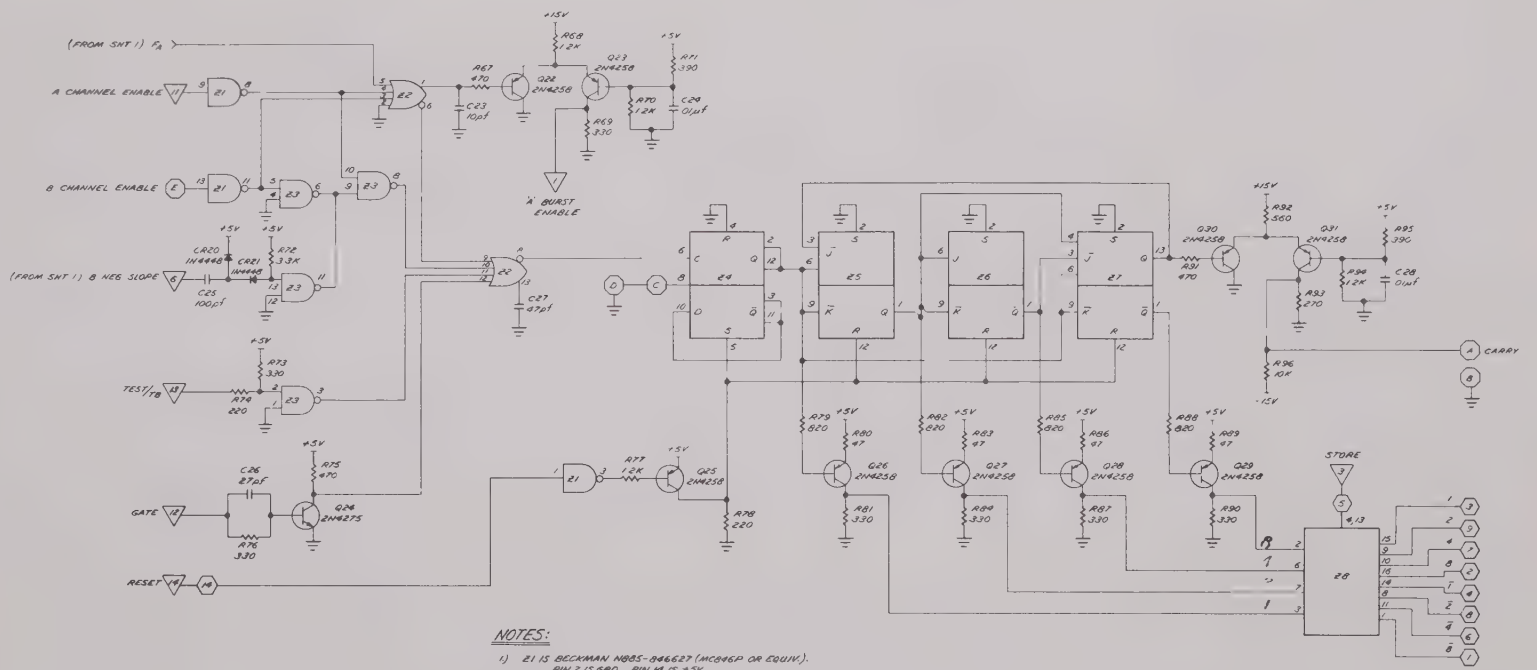
**"A. B." are Allen Bradley, fixed composition resistors.

INPUT BOARD ASSEMBLY (A1) - PARTS LIST - continued

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
R12	614-857573	Resistor, Variable, 5K, 1/8W, 20%	CTS X201R502B	1
R13, 14, 15, 16, 52, 53, 54	601-822527	Resistor, 1.5K, 1/4W, 5%	*A.B. CB1525	7
R17, 55	601-822375	Resistor, 82Ω, 1/4W, 5%	A.B. CB8205	2
R18, 41, 57, 59	601-823379	Resistor, 10Ω, 1/4W, 5%	A.B. CB1005	4
R19, 25, 31, 35, 36, 61, 66, 74, 78, 98	601-822327	Resistor, 220Ω, 1/4W, 5%	A.B. CB2215	10
R22	601-823389	Resistor, 68Ω, 1/4W, 5%	A.B. CB6805	1
R23	601-823390	Resistor, 120Ω, 1/4W, 5%	A.B. CB1215	1
R24, 63, 79, 82, 85, 88, 97	601-822306	Resistor, 820Ω, 1/4W, 5%	A.B. CB8215	7
R26, 28, 29, 32, 33, 40, 60, 65, 67, 75, 91	601-823395	Resistor, 470Ω, 1/4W, 5%	A.B. CB4715	11
R27, 80, 83, 86, 89	601-823387	Resistor, 47Ω, 1/4W, 5%	A.B. CB4705	5
R30, 34	601-822299	Resistor, 6.8K, 1/4W, 5%	A.B. CB6825	2
R37, 51	601-822297	Resistor, 4.7K, 1/4W, 5%	A.B. CB4725	2
R44, 46	601-823381	Resistor, 15Ω, 1/4W, 5%	A.B. CB1505	2
R48, 71, 95, 99	601-822371	Resistor, 390Ω, 1/4W, 5%	A.B. CB3915	4
R49	601-822335	Resistor, 27K, 1/4W, 5%	A.B. CB2735	1
R50	614-864261	Resistor, Variable, 25K, 1/8W, 20%	CTS X-201	1
R62, 93	601-823393	Resistor, 270Ω, 1/4W, 5%	A.B. CB2715	2
R68, 70, 77, 94	601-822326	Resistor, 1.2K, 1/4W, 5%	A.B. CB1225	4
R72	601-822296	Resistor, 3.3K, 1/4W, 5%	A.B. CB3325	1
R92	601-823396	Resistor, 560Ω, 1/4W, 5%	A.B. CB5615	1
R96	601-822324	Resistor, 10K, 1/4W, 5%	A.B. CB1035	1
XZ1 thru XZ7, XW1, XW3	860-857545	Socket, I.C., 14-Pin Dual In-Line	Cinch Mfg. Co. 133-51-02-003	9
XZ8	860-857544	Socket, I.C., 16-Pin Dual In-Line	Cinch Mfg. Co. 51-02-006	1
Z1	885-846627	I.C., MC846P	Motorola	1
Z2	885-857589	I.C., MC1023P, or equivalent	Motorola	1
Z3	885-857591	I.C., MC1010P, or equivalent	Motorola	1
Z4	885-857537	I.C., MC1034P	Motorola	1
Z5, 6, 7	885-857590	I.C., MC1013P, or equivalent	Motorola	3
Z8	885-857576	I.C., SN7475N, or equivalent	Texas Instruments	1

*"A.B." are Allen Bradley, fixed composition, resistors.

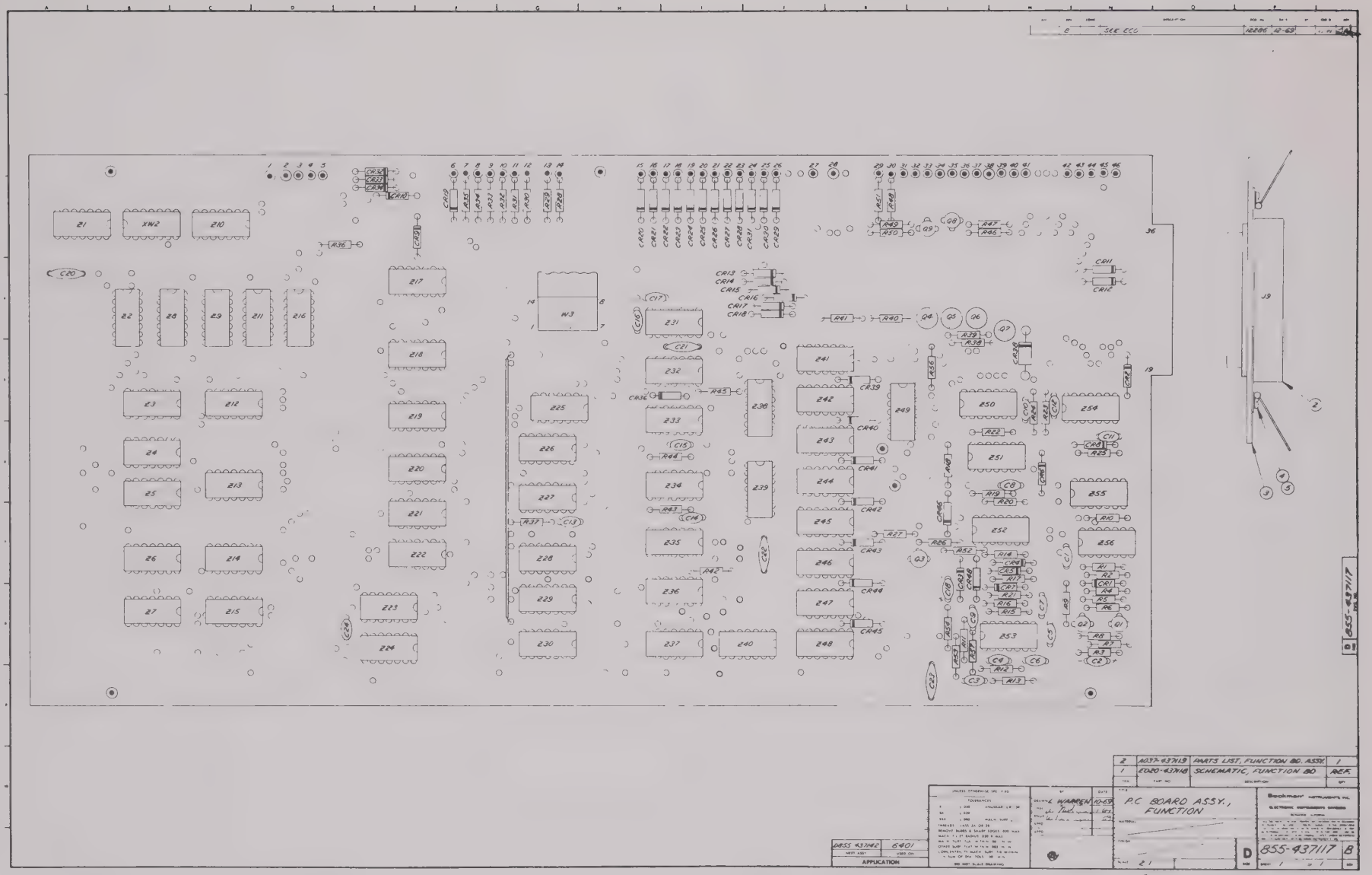

A1 INPUT BD ASSY. 0855-437037
ATTEN. A TRIGGER
A7 ATTEN/TRIGGER ASSY. 0855-437030
"A" INPUT
A TRIGGER LEVEL
PRESET
LOCAL
SEE SHEET 2
A POS. SLOPE
A NEG. SLOPE
ATTEN. B TRIGGER
A8 ATTEN/TRIGGER ASSY. 0855-437030
"B" INPUT
B TRIGGER LEVEL
B NEG. SLOPE (CONT. ON SHT. 2)
B POS. SLOPE
+15V
-15V
+5V
GND
NOTES: EXCEPT AS NOTED
1 RESISTORS ARE ¼W, 5%
2 NOMINAL VALUE.
3 INTEGRATED CIRCUITS
A1 IS N885-846627 PIN 7 IS GRD.; PIN 14 IS +5V
A2 IS N885-857589 PINS 2&7 ARE GRD.; PIN 14 IS +5V.
A3 IS N885-857591 PINS 1,4&7 ARE GRD; PIN 14 IS +5V
A4 IS N885-857537 PINS 4,7&8 ARE GRD., PINS 1&14 ARE +5V.
A5,6&7 ARE N885-857590. PINS 3,4,5,7,8,10&11 ARE GRD., PIN 14 IS +5V. PIN 3 IS NOT GRD. ON A5 PINS 3&8 ARE NOT GRD. ON A7
A8 IS N885-857576 PIN 12 IS GRD., PIN 5 IS +5V.
4. ○ - INDICATES WIRE TIE PTS ON INPUT BD.-A1.
5. ▽ - INDICATES PINS ON W3 TO FUNCTION BD.-A2.
6. ○ - INDICATES PINS ON W1 TO COUNT BD.-A3.
7. ⬭ INDICATES WIRE TIE PTS ON FUNCTION BD.-A2
GATE LIGHT DRIVE
ACCESS COMMAND
EXT. INHIBIT
SCHEMATIC, INPUT-A1, A7 & A8
Beckman INSTRUMENTS, INC. ELECTRONIC COMPONENTS DIVISION
020-437036 B
0855-437037 6401
APPLICATION
DO NOT SCALE DRAWING



NOTES:

1) 21 IS BECKMAN N885-846627 (MC846P OR EQUIV.). PIN 7 IS GRD., PIN 14 IS +5V.
2) 22 IS BECKMAN N885-857589 (MC1023P OR EQUIV.). PIN 7 IS GRD., PIN 16 IS +5V.
3) 23 IS BECKMAN N885-857591 (MC1010P OR EQUIV.). PIN 7 IS GRD., PIN 14 IS +5V.
4) 24 IS BECKMAN N885-857537 (MC1034P OR EQUIV.). PIN 7 IS GRD., PIN 14 IS +5V.
5) 25, 26, 27 ARE BECKMAN N885-857530 (MC1013P OR EQUIV.) PIN 7 IS GRD., PIN 14 IS +5V; ALL UNUSED INPUTS GROUNDED
6) 28 IS BECKMAN N885-857576 (SN7475 OR EQUIV.). PIN 12 IS GRD., PIN 5 IS +5V

SCHEMATIC, INPUT-A1, A7&A8	BECKMAN INSTRUMENTS, INC. ELECTRO SCIENCE DIVISION
D	020-437036 B


P.C BOARD ASSY., FUNCTION
855-437117
B
D
6401
APPLICATION

FUNCTION BOARD ASSEMBLY (A2) - PARTS LIST

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty. / Assy.
	D-437117-B	Function Board Assembly	Beckman	
C1, 15	637-826136	Capacitor, 120pf, 500V, 5%	*DM15F121J0-500WV4CR	2
C2, 18	631-857569	Capacitor, 33μf, 15V, 20%	Sprague 196D336X0015FB	2
C3	637-822973	Capacitor, 68pf, 500V, 5%	DM15E680J0-500WV4CR	1
C4	637-837854	Capacitor, 240pf, 500V, 5%	DM15F241J0-500WV4CR	1
C5	633-857080	Capacitor, 3300pf, 500V, 20%	Sprague 19C404A	1
C6, 8	637-822251	Capacitor, 100pf, 500V, 5%	DM15F101J0-500WV4CR	2
C7, 11, 12, 24	633-836864	Capacitor, 0.01μf, 100V	Sprague C023B101F103M	4
C9	633-846738	Capacitor, 0.02μf, 50V, 20%	Sprague 55C21A2	1
C10, 16, 17	637-822908	Capacitor, 330pf, 500V, 5%	DM15F331J0-500WV4CR	3
C13, 14	637-822771	Capacitor, 82pf, 500V, 5%	DM15E820J0-500WV4CR	2
C19	633-804706	Capacitor, 0.001μf, 1KV	Centralab DD-102	1
C20, 21, 22, 23	633-815873	Capacitor, 0.33μf, 25V	Sprague 5C023334D8250B3	4
CR1 thru 31, 36,39 thru 46, 48	755-838731	Diode, 1N4448	Continental Devices	41
CR32, 33, 34	755-420893	Diode, Special	Beckman	3
CR38	755-416842	Diode, Special	Beckman	1
J9	672-824764	Connector, 36 Contact	Amphenol 57-40360	1
Q1	755-845089	Transistor, 2N4258	Fairchild	1
Q2, 3, 8, 9	755-857274	Transistor, 2N4275	Fairchild	4
Q4, 5, 6, 7	755-839888	Transistor, 2N3638A	Fairchild	4
R1, 2, 15, 16, 19, 20, 23, 24	601-822299	Resistor, 6.8K, 1/4W, 5%	**A.B. CB6825	8
R3, 11	601-822297	Resistor, 4.7K, 1/4W, 5%	A.B. CB4725	2
R4, 9, 10, 18, 22, 36	601-822308	Resistor, 1K, 1/4W, 5%	A.B. CB1025	6
R5	601-822296	Resistor, 3.3K, 1/4W, 5%	A.B. CB3325	1
R6	601-822460	Resistor, 3.9K, 1/4W, 5%	A.B. CB3925	1
R7	601-823384	Resistor, 27Ω, 1/4W, 5%	A.B. CB2705	1
R8	601-823912	Resistor, 470K, 1/4W, 5%	A.B. CB4745	1
R12, 13, 46, 49	601-823395	Resistor, 470Ω, 1/4W, 5%	A.B. CB4715	4
R14, 17, 21, 25, 52	601-822324	Resistor, 10K, 1/4W, 5%	A.B. CB1035	5
R26	601-822544	Resistor, 1.8K, 1/4W, 5%	A.B. CB1825	1
R27	601-822369	Resistor, 680Ω, 1/4W, 5%	A.B. CB6815	1
R28 thru 35, 45	601-823379	Resistor, 10Ω, 1/4W, 5%	A.B. CB1005	9

continued. . .

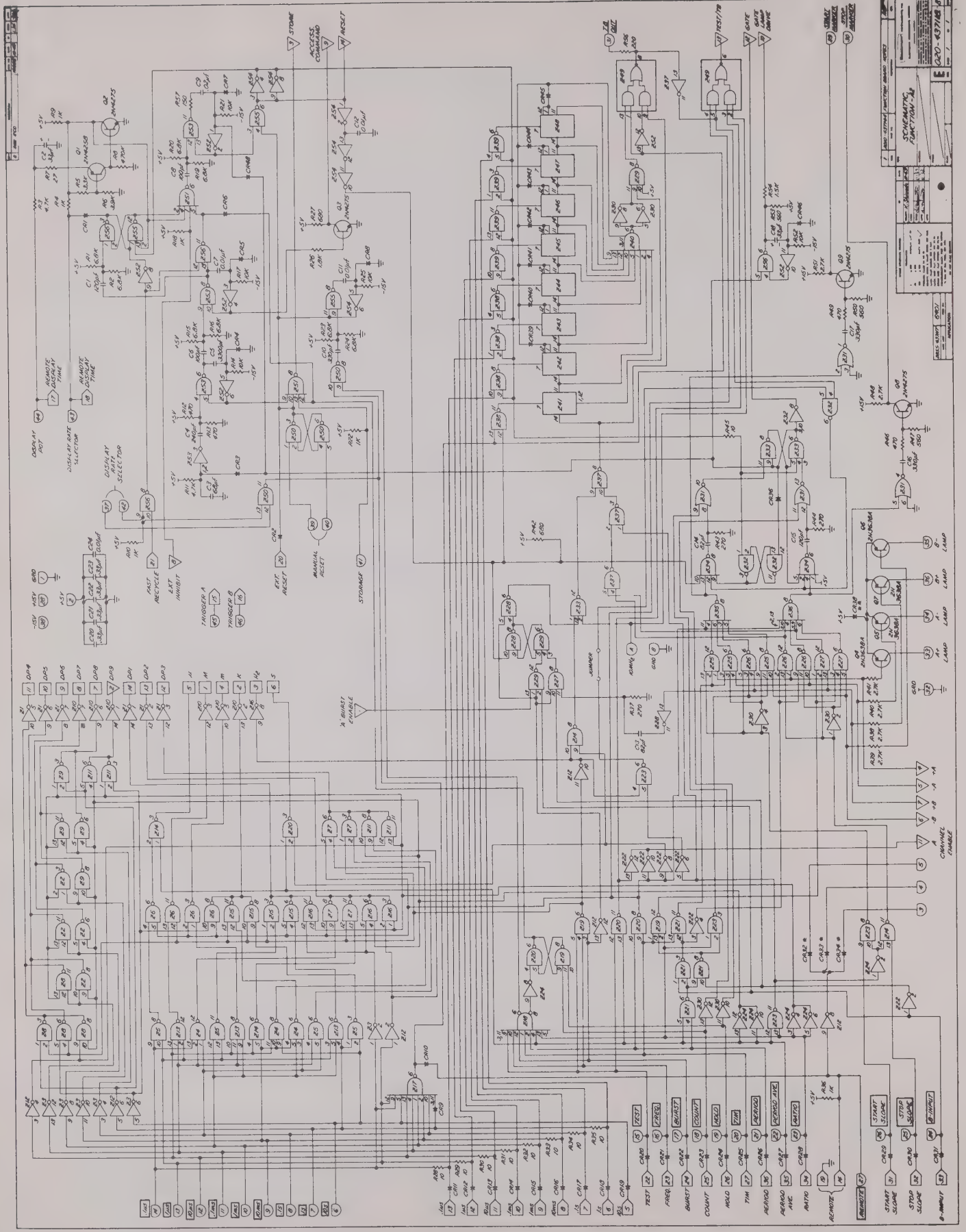
* "DM15...." are Electromotive capacitors.

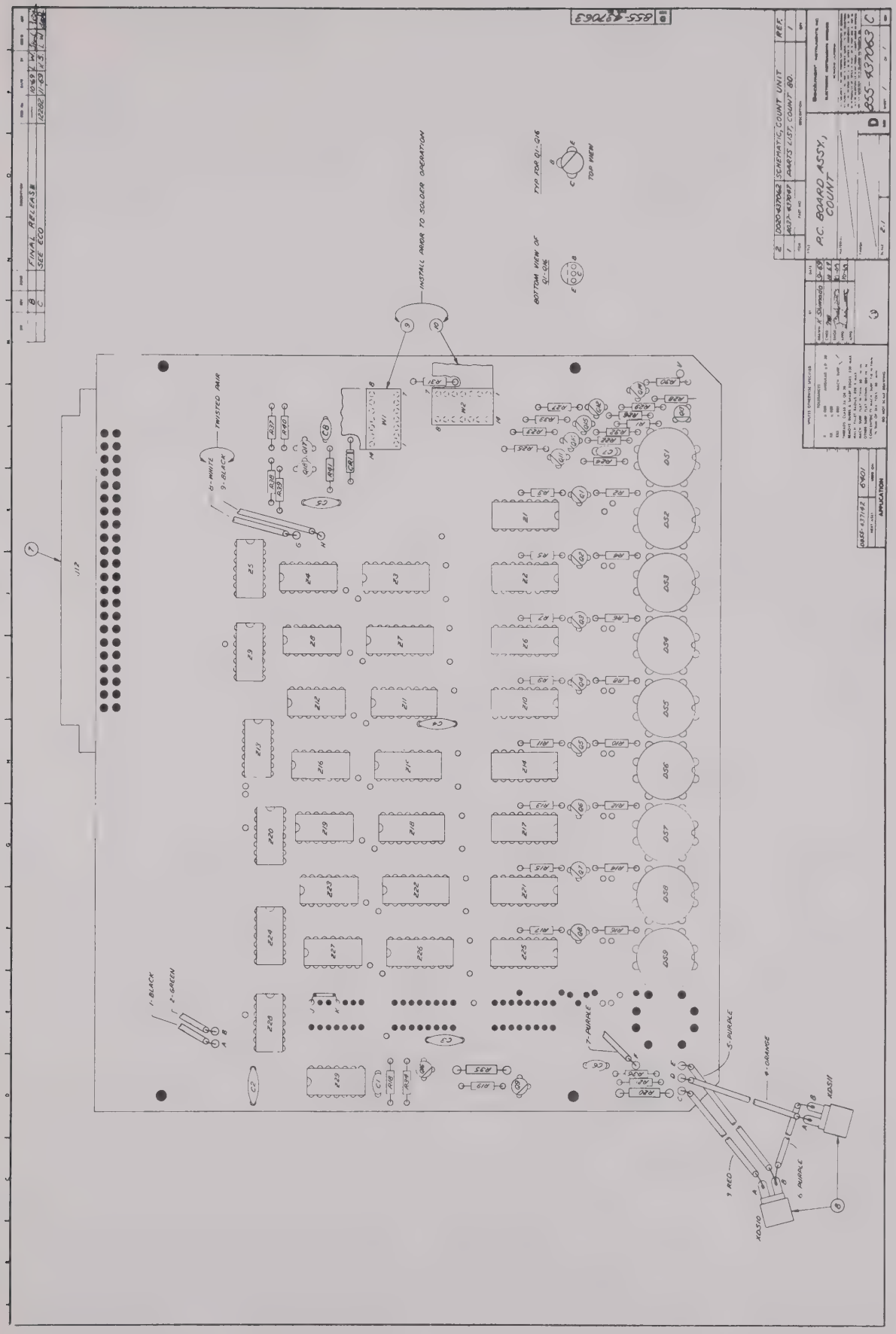
** "A.B." are Allen Bradley, fixed composition resistors.

FUNCTION BOARD ASSEMBLY (A2) - PARTS LIST - continued

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
R37, 43, 44	601-823393	Resistor, 270Ω, 1/4W, 5%	*A. B. CB2715	3
R38, 39, 40, 14, 49, 51	601-822295	Resistor, 2.7K, 1/4W, 5%	A. B. CB2725	6
R42	601-822371	Resistor, 390Ω, 1/4W, 5%	A. B. CB3915	1
R47, 50, 53	601-823396	Resistor, 560Ω, 1/4W, 5%	A. B. CB5615	3
R54	601-822527	Resistor, 1, 5K, 1/4W, 5%	A. B. CB1525	1
R57	601-823391	Resistor, 150Ω, 1/4W, 5%	A. B. CB1515	1
XZ1 thru XZ56, XW2	860-857545	I. C. Socket, 14 Position	Cinch Mfg. 133-51-02-003	57
Z1, 10	885-857580	I. C., MC889P, or equivalent	Motorola	2
Z2, 5, 6, 7, 8, 9, 11, 14, 15, 16, 20, 21, 23, 38, 39, 50, 56	885-846627	I. C., MC846P	Motorola	17
Z3, 12, 22, 24, 30, 52, 54	885-846628	I. C., MC837P	Motorola	7
Z4, 13, 19	885-846625	I. C., MC862P	Motorola	3
Z17, 18, 40	885-846631	I. C., MC830P	Motorola	3
Z25, 26, 27, 29, 55	885-857582	I. C., SN7410N, or equivalent	Texas Instruments	5
Z28, 32, 37	885-857583	I. C., SN7400N, or equivalent	Texas Instruments	3
Z31	885-857538	I. C., SN7402N	Texas Instruments	1
Z33	885-857584	I. C., SN74H10N, or equivalent	Texas Instruments	1
Z34	885-857586	I. C., SN7420N, or equivalent	Texas Instruments	1
Z35, 36	885-857575	I. C., SN7430N	Texas Instruments	2
Z41 thru Z48	885-857577	I. C., SN7490N, or equivalent	Texas Instruments	8
Z49	885-857555	I. C., SN7450N	Texas Instruments	1
Z51	885-857585	I. C., SN7420N, or equivalent	Texas Instruments	1
Z53	885-857593	I. C., SN74H00N, or equivalent	Texas Instruments	1
W3	664-437125	Cable Assembly	Beckman	1

*"A. B." are Allen Bradley, fixed composition resistors.

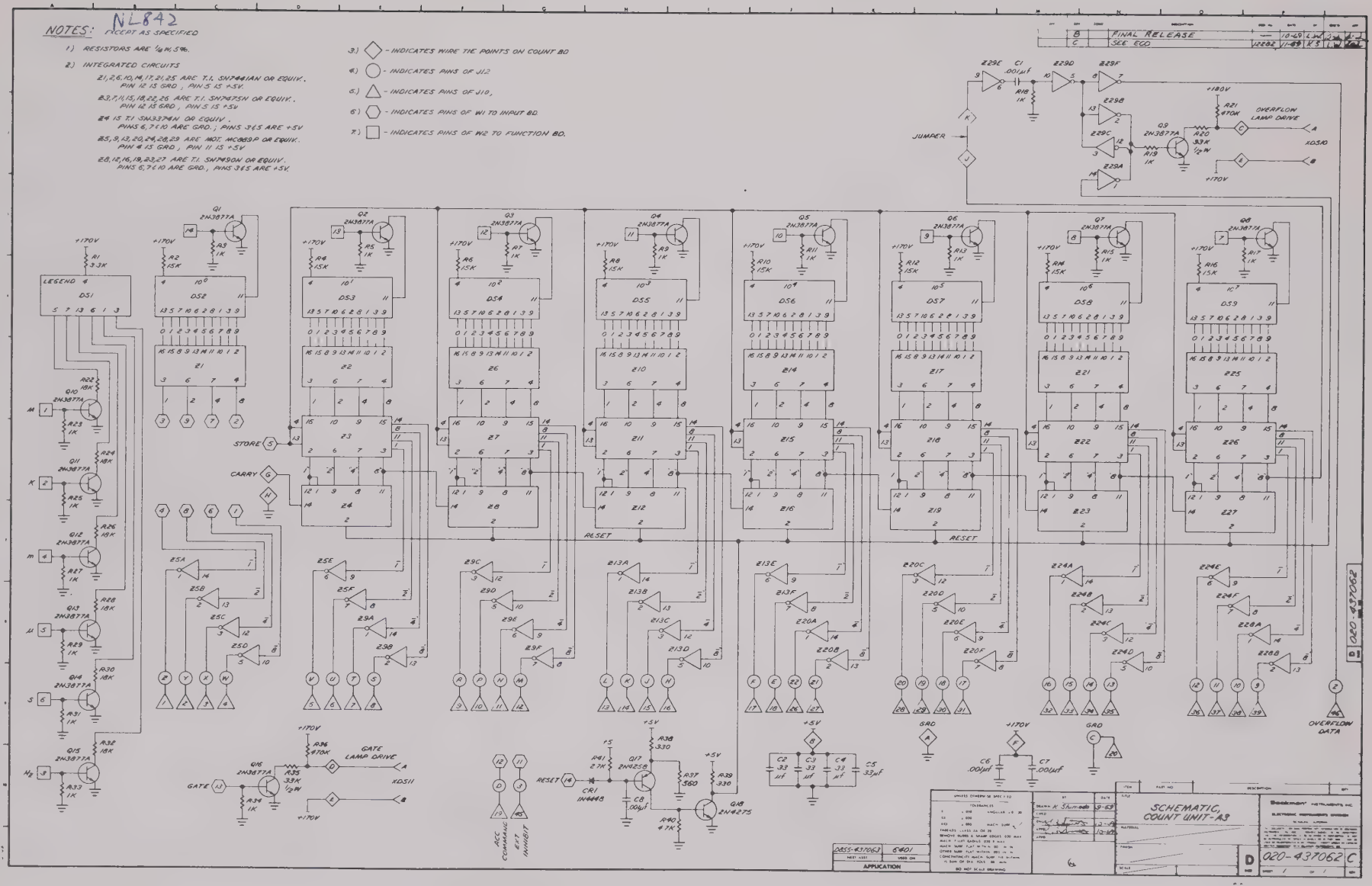


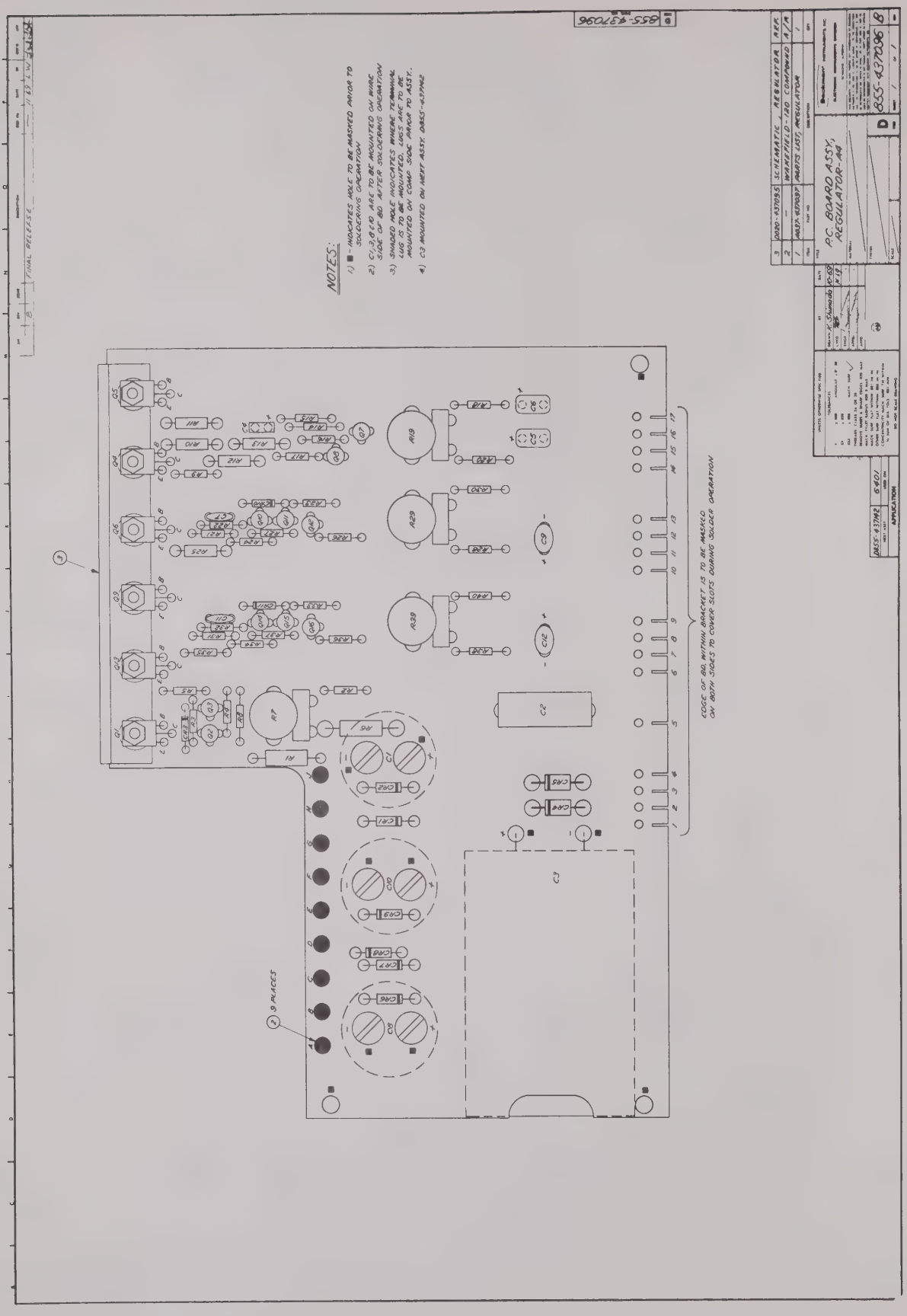

INSTALL WIRES TO SOLDER OPERATION
BOTTOM VIEW OF Q1-Q16
TYP FOR Q1-Q16
TOP VIEW
4-WHITE
3-BLACK
TWISTED PAIR
1-BLACK
2-GREEN
7-PURPLE
5-PURPLE
8-ORANGE
1 RED
6 PURPLE
XDS10
XDS11
P.C. BOARD ASSY, COUNT
SCHEMATIC, COUNT UNIT
PARTS LIST, COUNT BD.
FINAL RELEASE
SEE ECO

COUNT BOARD ASSEMBLY (A3) - PARTS LIST

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
	D-437063-C	Count Board (A3)	Beckman	
C1, 6, 7, 8	633-804706	Capacitor, F. Cerm., 0.001μf, 1KV, ±10%	Centralab DD-102	4
C2, 3, 4, 5	633-815873	Capacitor, F. Cerm., 0.33μf, 25V, ±20%	Sprague 5C023334-D8250B3	4
CR1	755-838731	Diode, 1N4448	Continental Devices	1
DS1	751-857284	Readout Tube, Legend	Nat'l Eltrn's. NL-867	1
DS2 thru DS9	751-857285	Readout Tube, Numerical	Nat'l Eltrn's. NL-842	8
J12	680-857546	Connector, 22 Double R/O	Amphenol 225-22221-105	1
Q1 thru Q16	755-846287	Transistor, 2N3877A	G.E.	16
Q17	755-845089	Transistor, 2N4258	Fairchild	1
Q18	755-857274	Transistor, 2N4275	Fairchild	1
R1	601-822296	Resistor, 3.3K, 1/4W, 5%	*A.B. CB3325	1
R2, 4, 6, 8, 10, 12, 14, 16	601-822301	Resistor, 15K, 1/4W, 5%	A.B. CB1535	8
R3, 5, 7, 9, 11, 13, 15, 17, 18, 19, 23, 25, 27, 29, 31, 33, 34	601-822308	Resistor, 1K, 1/4W, 5%	A.B. CB1025	17
R20, 35	601-015060	Resistor, 33K, 1/2W, 5%	A.B. EB3335	2
R21, 36	601-823912	Resistor, 470K, 1/4W, 5%	A.B. CB4745	2
R22, 24, 26, 28, 30, 32	601-822303	Resistor, 18K, 1/4W, 5%	A.B. CB1835	6
R37	601-823396	Resistor, 560Ω, 1/4W, 5%	A.B. CB5615	1
R38	601-823394	Resistor, 330Ω, 1/4W, 5%	A.B. CB3315	1
R40	601-822297	Resistor, 4.7K, 1/4W, 5%	A.B. CB4725	1
R41	601-822295	Resistor, 2.7K, 1/4W, 5%	A.B. CB2735	1
XDS1 thru 9	860-857331	Socket, Readout	Nat'l RTS-29	9
XDS10, 11	824-846653	Socket, Lamp	Eldema Q082-2K	2
XZ1, 2, 3, 6, 7, 10, 11, 14, 15, 17, 18, 21, 22, 25, 26	860-857544	Socket, I.C., 16-Pin Dual Inline	Cinch Mfg. Co. 133-51-02-006	15
XZ4, 5, 8, 9, 12, 13, 16, 19, 20, 23, 24, 27, 28, 29	860-857545	Socket, I.C., 14-Pin Dual Inline	Cinch Mfg. Co. 133-51-02-003	14
Z1, 2, 6, 10, 14, 17, 21, 25	885-857578	I.C., BCD-to-Decimal Decoder, SN7441AN	Texas Instruments	8
Z3, 7, 11, 15, 18, 22, 26	885-857576	I.C., Quadruple Bistable Latch, SN7475N	Texas Instruments	7
Z4	885-857579	I.C., Decade Counter/25 MHz, SN3374N	Texas Instruments	1
Z5, 9, 13, 20, 24, 28, 29	885-857580	I.C., Hex Inverter MC889P	Motorola	7
Z8, 12, 16, 19, 23, 27	885-857577	I.C., Decade Counter/10 MHz, SN7490N	Texas Instruments	6

*"A.B." are Allen Bradley, fixed composition resistors.


NOTES: NL842 EXCEPT AS SPECIFIED
1.) RESISTORS ARE 1/4 W, 5%.
2.) INTEGRATED CIRCUITS
Z1,2,6,10,14,17,21,25 ARE T.I. SN7441AN OR EQUIV., PIN 12 IS GRD, PIN 5 IS +5V.
Z3,7,11,15,18,22,26 ARE T.I. SN7475N OR EQUIV., PIN 12 IS GRD, PIN 5 IS +5V.
Z4 IS T.I. SN7437AN OR EQUIV., PINS 6,7,10 ARE GRD.; PINS 3&5 ARE +5V.
Z5,9,13,20,24,28,29 ARE MOT. MC889P OR EQUIV. PIN 4 IS GRD, PIN 11 IS +5V.
Z8,12,16,19,23,27 ARE T.I. SN7490N OR EQUIV., PINS 6,7&10 ARE GRD., PINS 3&5 ARE +5V.
3.) ◇ - INDICATES WIRE TIE POINTS ON COUNT BD
4.) ○ - INDICATES PINS OF J12
5.) △ - INDICATES PINS OF J10,
6.) ⬡ - INDICATES PINS OF W1 TO INPUT BD.
7.) □ - INDICATES PINS OF W2 TO FUNCTION BD.
B FINAL RELEASE 10-69 LW
C SEE ECO V2282 VI-69 KS
JUMPER
OVERFLOW LAMP DRIVE
OVERFLOW DATA
STORE
CARRY
RESET
GATE LAMP DRIVE
ACC. COMMAND
EXT. INHIBIT
SCHEMATIC, COUNT UNIT-A3
020-437062 C
D 020-437062
DRAWN A. Simonds 9-69
APPROVED 12-69
APPLICATION
DO NOT SCALE DRAWING


NOTES:
1) ■ - INDICATES HOLE TO BE MASKED PRIOR TO SOLDERING OPERATION
2) C1,3,8,10 ARE TO BE MOUNTED ON WIRE SIDE OF BD AFTER SOLDERING OPERATION
3) SHADED HOLE INDICATES WHERE TERMINAL LUG IS TO BE MOUNTED. LUGS ARE TO BE MOUNTED ON COMP SIDE PRIOR TO ASSY.
4) C3 MOUNTED ON HEAT ASSY. 0885-437042
EDGE OF BD WITHIN BRACKET IS TO BE MASKED ON BOTH SIDES TO COVER SLOTS DURING SOLDER OPERATION
9 PLACES
P.C. BOARD ASSY, REGULATOR-A4
0885-437096
6401

REGULATOR BOARD (A4) - PARTS LIST

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty. / Assy.
	D855-437096-B	Regulator Board (A4)	Beckman	
C1	631-857554	Capacitor, Elect., 95μf, 350V	*36D950F350AA-2A	1
C2	641-859091	Capacitor, 0.1μf, 400V, 10%	Cornel D DPMS-4P1	1
C3	631-857552	Capacitor, Elect., 0.028f, 10V	*36D283G010BB-2A	1
C4	631-857567	Capacitor, Elect., 4.7μf, 25V, 20%	Kemet K4R7W25	1
C5, 6	631-857307	Capacitor, Elect., 250μf, 6V, 20%	Components, Inc. TSD5-6-257	2
C7, 11	633-836864	Capacitor, F. Cerm., 0.01μf, 100V	*C023B101F103M	2
C8, 10	631-857304	Capacitor, Elect., 2700μf, 25V	*36D272G025AA2B	2
C9, 12	631-857569	Capacitor, Elect., 33μf, 15V, 20%	*196D336X0015FB	2
CR1, 2, 6, 7, 8, 9	755-416842	Diode, Special	Beckman	6
CR3	755-857550	Diode, Zener, 75V, 1W, 10%, 1N4761	Motorola	1
CR4, 5	755-857551	Diode, 1N5198	Semtech	2
CR10, 11	755-818496	Diode, 5.1V, 5%, 1N751A	Motorola	2
Q1	755-866485	Transistor, 2N5195	Motorola	1
Q2, 3, 7, 8, 11, 12, 14	755-839888	Transistor, 2N3638A	Fairchild	7
Q4, 5, 9	755-862086	Transistor, 2N5193	Motorola	3
Q6, 13	755-862085	Transistor, 2N5190	Motorola	2
Q10, 15, 16	755-838784	Transistor, 2N3565	Fairchild	3
R1	601-800049	Resistor, 220Ω, 1W, 5%	**A.B. GB2215	1
R2	601-822301	Resistor, 15K, 1/4W, 5%	A.B. CB1535	1
R3	601-823397	Resistor, 5.6K, 1/4W, 5%	A.B. CB5625	1
R4	601-822297	Resistor, 4.7K, 1/4W, 5%	A.B. CB4725	1
R5, 23, 33, 35	601-822308	Resistor, 1K, 1/4W, 5%	A.B. CB1025	4
R6	601-800068	Resistor, 56K, 1W, 5%	A.B. GB5635	1
R7	614-836291	Resistor, Var., 1K, 1/8W, 30%	CTS U-201	1
R8	607-828896	Resistor, F. Film, 6.81K, 1/4W, 1%	IRC CEB-T0	1
R9, 21, 31	601-822296	Resistor, 3.3K, 1/4W, 5%	A.B. CB3325	3
R10, 11, 13	601-022946	Resistor, 10Ω, 1/2W, 5%	A.B. EB1005	3
R12	601-800005	Resistor, 22Ω, 1/2W, 5%	A.B. EB2205	1
R14	607-826634	Resistor, F. Film, 1.21K, 1/4W, 1%	IRC CEB-T0	1
R15	607-833110	Resistor, F. Film, 249Ω, 1/4W, 1%	IRC CEB-T0	1
R16, 22, 32	601-822527	Resistor, 1.5K, 1/4W, 5%	A.B. CB1525	3
R17, 27, 37	601-823396	Resistor, 560Ω, 1/4W, 5%	A.B. CB5615	3
R18, 20	607-833764	Resistor, F. Film, 182Ω, 1/4W, 1%	IRC CEB-T0	2
R19	614-844215	Resistor, Var., 100Ω, 1/8W, 30%	CTS U-201	1
R24, 34	601-822324	Resistor, 10K, 1/4W, 5%	A.B. CB1035	2

continued. . .

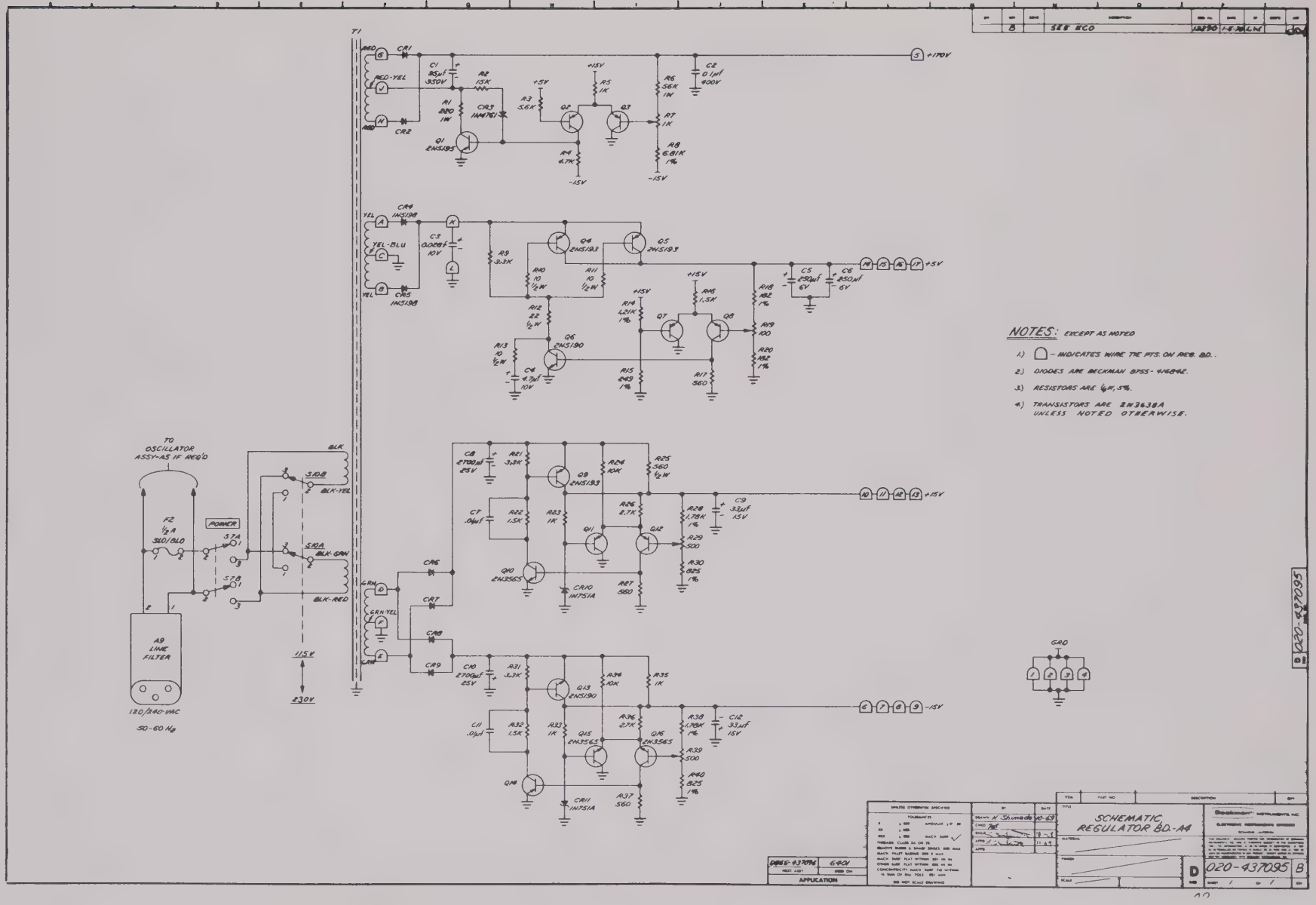
* Sprague capacitors.

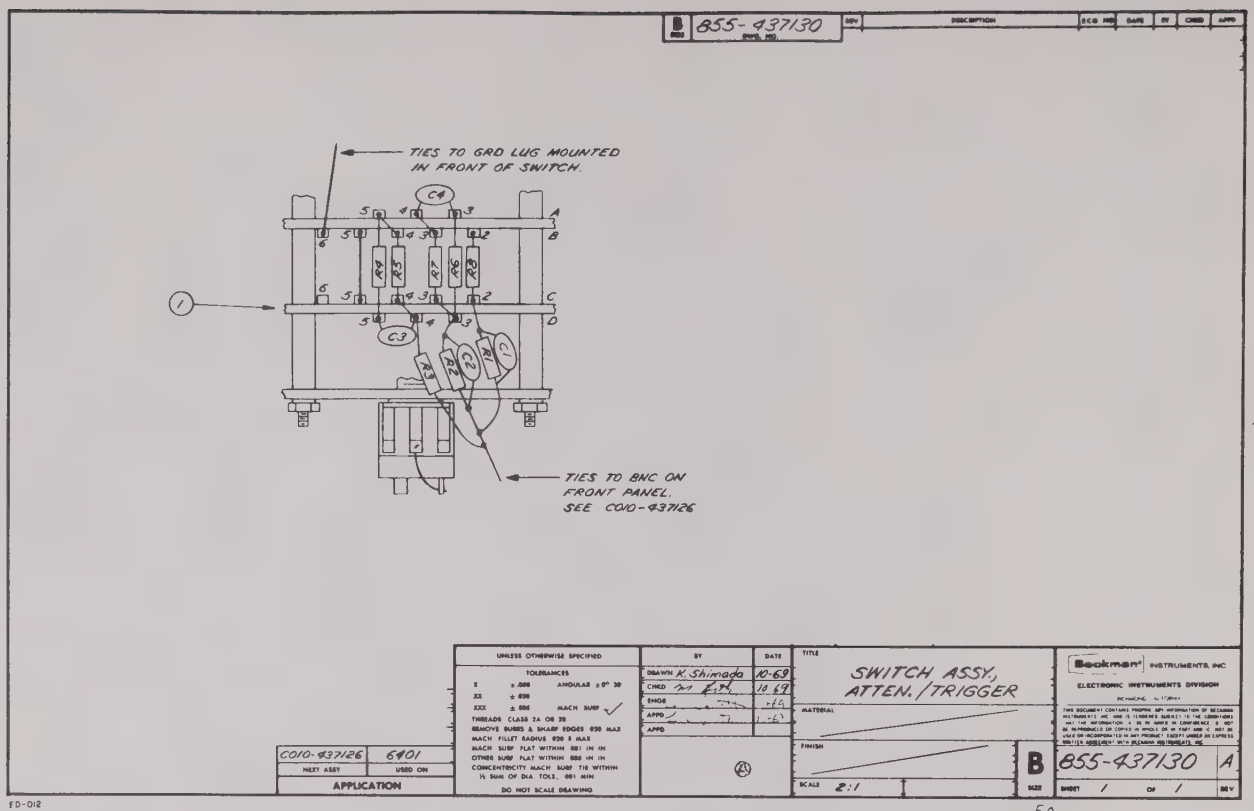
** "A.B." are Allen Bradley, fixed composition, resistors.

REGULATOR BOARD (A4) - PARTS LIST - continued

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty. / Assy.
R25	601-079492	Resistor, 560Ω, 1/2W, 5%	*A.B. EB5615	1
R26,36	601-822295	Resistor, 2.7K, 1/4W, 5%	A.B. CB2725	2
R28,38	607-821612	Resistor, F. Film, 1.78K, 1/4W, 1%	IRC CEB-T0	2
R29,39	614-857557	Resistor, Var., 500Ω, 1/8W, 20%	CTS U201R501B	2
R30,40	607-822186	Resistor, F. Film, 825Ω, 1/4W, 1%	IRC CEB-T0	2
	776-437093	Heat Sink	Beckman	1

*"A.B." are Allen Bradley, fixed composition, resistors.

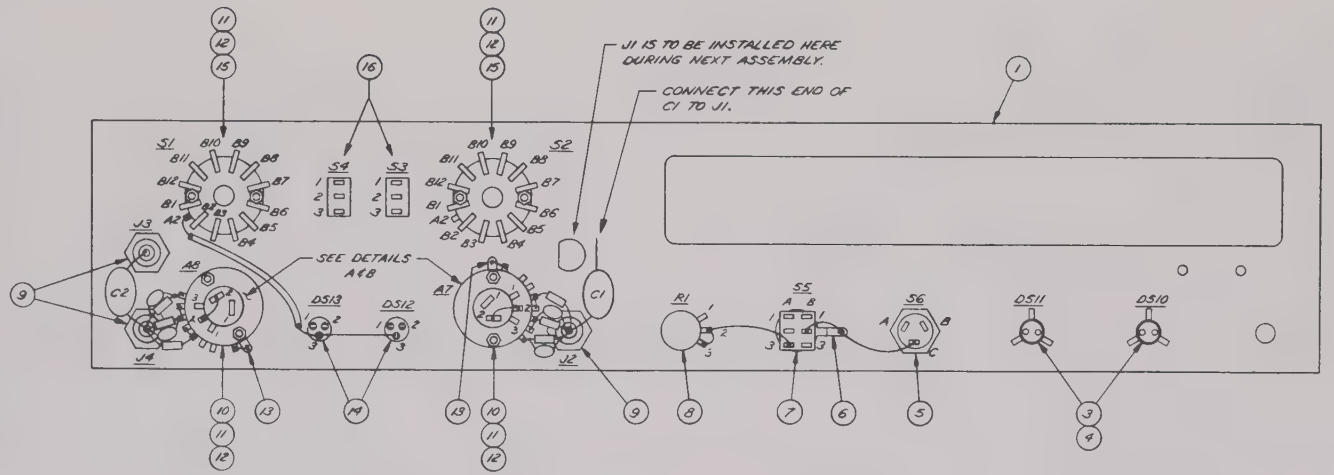

T1
CR1
CR2
CR3 1N4761
Q1 2N5195
Q2
Q3
+170V
CR4 1N5198
CR5 1N5198
Q4 2N5193
Q5 2N5193
Q6 2N5190
+5V
Q7
Q8
CR6
CR7
CR8
CR9
Q9 2N5193
Q10 2N3563
Q11
Q12
CR10 1N751A
+15V
Q13 2N5190
Q14
Q15 2N3563
Q16 2N3563
CR11 1N751A
-15V
TO OSCILLATOR ASSY-AS IF REQ'D
F2 1/2 A SLO/BLO
POWER
S7A
S7B
S10B
S10A
BLK
BLK-YEL
BLK-GRN
BLK-RED
A9 LINE FILTER
115V
230V
120/240 VAC
50-60 Hz
GRN
GRN-YEL
YEL
YEL-BLU
RED
RED-YEL
GND
SEE ECO
NOTES: EXCEPT AS NOTED
1.) ⌂ - INDICATES WIRE THE PTS. ON REG. BD.
2.) DIODES ARE BECKMAN BYSS-476842.
3.) RESISTORS ARE 1/4W, 5%.
4.) TRANSISTORS ARE 2N3638A UNLESS NOTED OTHERWISE.
GND
SCHEMATIC REGULATOR BD-A4
020-437095 B
APPLICATION



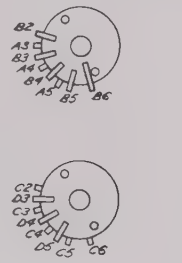
ATTEN./TRIGGER SWITCH ASSEMBLY (A7, A8) - PARTS LIST

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
	B855-437130-A	Atten./Trigger Switch Assembly	Beckman	
C1	633-857033	Capacitor, 0.002μf, 600V, 5%	Skottie TXD-4-202-K	1
C2	637-857359	Capacitor, 1.8pf, 500V, 5%	Electromotive DM15-C"1.8"DO-500WV4CR	1
C3	637-832598	Capacitor, 22pf, 500V, 5%	Electromotive DM15-C220J0-500WV4CR	1
C4	637-827575	Capacitor, 18pf, 500V, 5%	Electromotive DM15C-180J0-500WV4CR	1
R1, 7	601-823904	Resistor, 100K, 1/4W, 5%	*A.B. CB1045	2
R2, 3, 8	601-823916	Resistor, 1M, 1/4W, 5%	A.B. CB1055	3
R4	601-823391	Resistor, 150Ω, 1/4W, 5%	A.B. CB1515	1
R5	601-822324	Resistor, 10K, 1/4W, 5%	A.B. CB1035	1
R6	601-823393	Resistor, 270Ω, 1/4W, 5%	A.B. CB2715	1

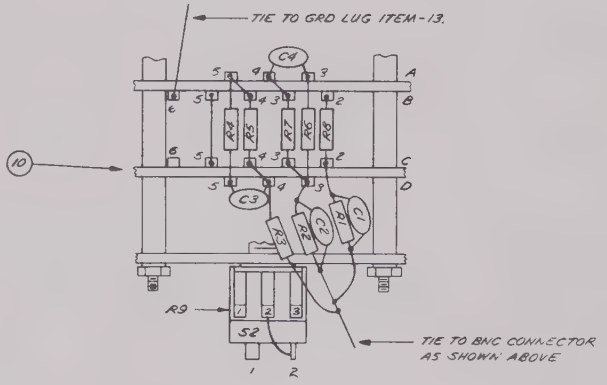
*"A.B." are Allen Bradley, fixed composition, resistors.



DETAIL B
TYP. FOR A7 & A8
SCALE: 2:1



DETAIL A
TYP. FOR A7 & A8



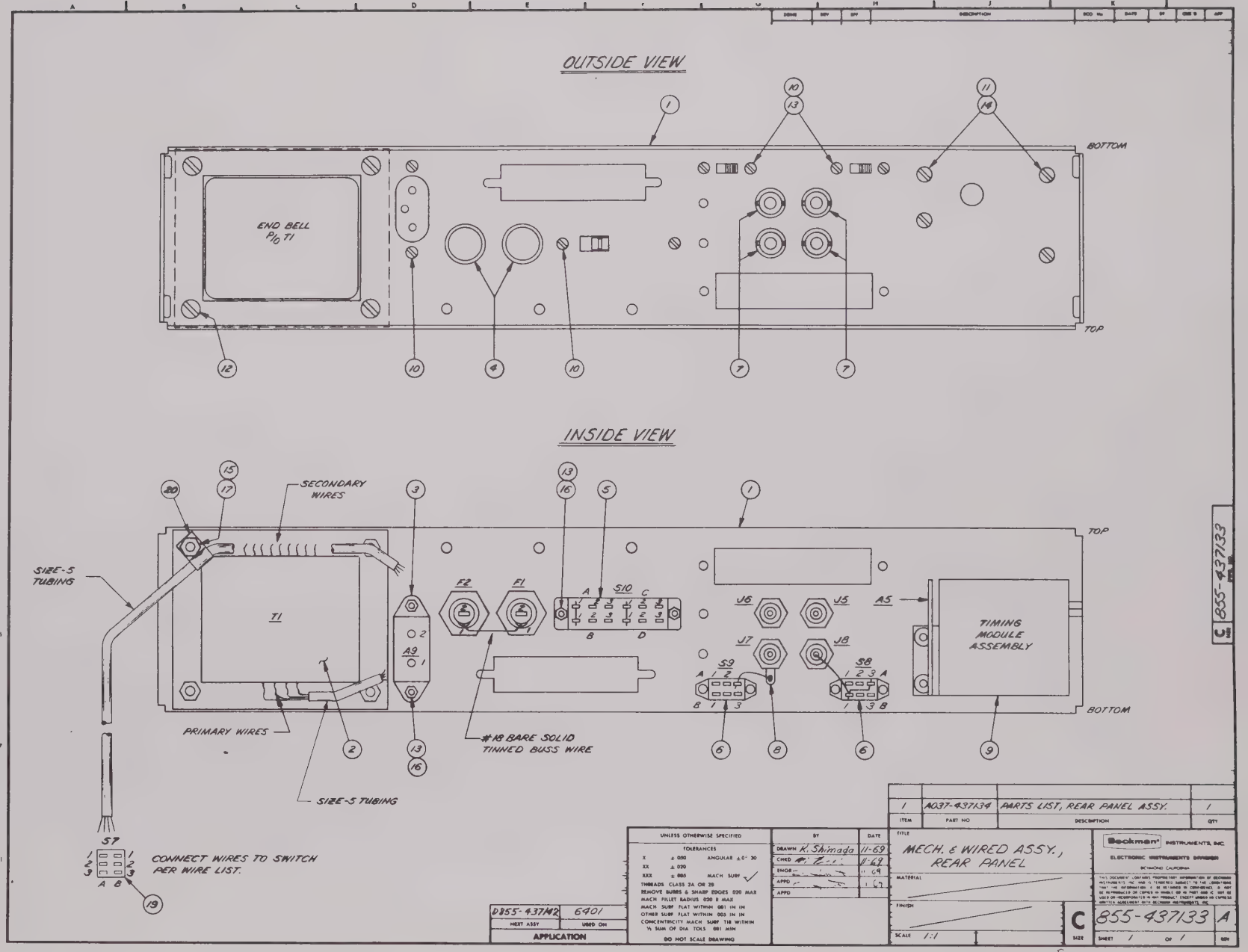
ITEM	PART NO	DESCRIPTION	QTY
1	A037-437129	PARTS LIST, MECH & WIRED ASSY, F PANEL	REF

DB55-437142	6401	TITLE: MECH & WIRED ASSY, FRONT PANEL	Beckman INSTRUMENTS, INC. ELECTRONIC INSTRUMENTS DIVISION
NEXT ASSY	USED ON	MATERIAL	
APPLICATION		FINISH	C 855-437126 A
		SCALE 1/1	SHEET 1 OF 1

UNLESS OTHERWISE SPECIFIED
TOLERANCES
X ± .030 ANGULAR ± 0° 30'
XX ± .020
XXX ± .005 MACH SURF ✓
THREADS CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES .020 R MAX
MACH FILLET RADIUS .020 R MAX
MACH SURF FLAT WITHIN .001 IN IN
OTHER SURF FLAT WITHIN .005 IN IN
CONCENTRICITY MACH SURF TIR WITHIN ½ SUM OF DIA TOL'S .001 MIN
DO NOT SCALE DRAWING

	BY	DATE
DRAWN	K. Shimada	10 69
CHKD		
ENGR		
APPD		
APPD		

855-437126 REV A



ITEM	PART NO	DESCRIPTION	QTY
1	A037-437134	PARTS LIST, REAR PANEL ASSY.	1

	BY	DATE
DRAWN	K. Shimada	11-69
CHKD		11-69
ENGR		11-69
APPD		1-69
APPD		

UNLESS OTHERWISE SPECIFIED

TOLERANCES

X ± .030 ANGULAR ±0° 30'
XX ± .010
XXX ± .005 MACH SURF ✓
THREADS CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES .020 MAX
MACH FILLET RADIUS .030 R MAX
MACH SURF FLAT WITHIN .001 IN IN
OTHER SURF FLAT WITHIN .003 IN IN
CONCENTRICITY MACH SURF TIR WITHIN
½ SUM OF DIA TOLS .001 MIN

DO NOT SCALE DRAWING

TITLE: MECH. & WIRED ASSY., REAR PANEL

MATERIAL

FINISH

SCALE 1:1

SIZE C

Beckman® INSTRUMENTS, INC.
ELECTRONIC INSTRUMENTS DIVISION
RICHMOND, CALIFORNIA

855-437133 A

SHEET 1 OF 1

D855-437142	6401
NEXT ASSY	USED ON
APPLICATION	

855-437133 A

FRONT PANEL MECHANICAL & WIRED ASSEMBLY - PARTS LIST

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
	C-437126-A	Front Panel Mechanical & Wired Assy.	Beckman	
A7, 8	855-437130	Attenuator Switch Assembly	Beckman	2
C1, 2	633-857572	Capacitor, 0.05μf, 1KV, +100 -0%	Aerovox GPDZ5V503P	2
DS10, 11	824-846836	Lamp, Neon, Red	Eldema CG03-RCS-N12C	2
DS12, 13	824-435662	Lamp Assembly	Beckman	2
J2, 3, 4	670-854373	Connector, BNC	Kings KC-79-35	3
R1	614-857570	Potentiometer, 500K, 1/4W, Linear	Mallory MLCN55L	1
S1, 2	711-437033	Switch, Rotary	Beckman	2
S3, 4	701-857324	Switch, SPDT, Toggle, w/Dress Nut	C & K 7101	2
S5	701-829909	Switch, DP3T, Toggle, w/Dress Nut	C & K 7203	1
S6	704-813496	Switch, SPDT, Pushbutton	Switchcraft 913	1
	132-824977	Clip, Lamp Mounting (use w/DS10, 11)	Eldema 081-10905	2
	662-437131	Cable Harness	Beckman	1

REAR PANEL MECHANICAL & WIRED ASSEMBLY - PARTS LIST

	C-437133-A	Rear Panel Mechanical & Wired Assy.	Beckman	
A5	855-437135	Timing Module Assembly	Beckman	1
A9	771-857281	Line Filter/Receptacle	Sprague JN10-1569A	1
J5, 6, 7, 8	670-854373	Connector, BNC	Kings KC-79-35	4
S7	701-857323	Switch, DPDT, Toggle, w/Dress Nut	C & K 7201	1
S8, 9	716-827410	Switch, Slide	Continental Wirt 126	2
S10	716-857542	Switch, Slide, 115/230	Switchcraft 47227LF	1
T1	792-437140	Transformer, Power, w/Cap.	Beckman	1
XF1, 2	735-007268	Fuse Post	Bussman HKP	2

MECHANICAL & WIRED ASSEMBLY - PARTS LIST

	D-437142-A	Mechanical & Wired Assembly	Beckman	
A1	855-437037	Input Board Assembly	Beckman	1
A2	855-437117	Function Board Assembly	Beckman	1
A3	855-437063	Count Board Assembly	Beckman	1
A4	855-437096	Regulator Board Assembly	Beckman	1
A6	855-437068	BCD Data Board Assembly	Beckman	1
F2	731-092114	Fuse, 1/2A, Slo-Blo	Littelfuse 312	1
J1	670-854373	Connector, BNC	Kings KC-79-35	1
J10	672-814649	Connector, 50 Position (for BCD Data Board Assembly)	Amphenol 57-40500	1
	325-816804	Knob, 1/8" Mtg., w/Dot	Raytheon	3
	325-840017	Knob, 1/4" Mtg., w/Cap	Raytheon 257	2
	325-857549	Knob, 1/4" Mtg., Concentric	Raytheon 70 Series	2
	313-516291	Foot	Beckman	4
	327-516292	Support Mount (Tilt Foot Bail)	Beckman	1
	664-853435	Line Cord, Detachable	Belden 17258	1
	330-516285	Handle	Beckman	2
	330-526309	Handle, Grip	Beckman	2
	338-813038	Capacitor Mtg. Clamp	Mallory VR-8	1
	783-807862	Ferrite Bead	Ferroxcube 56-590-65/3B	2

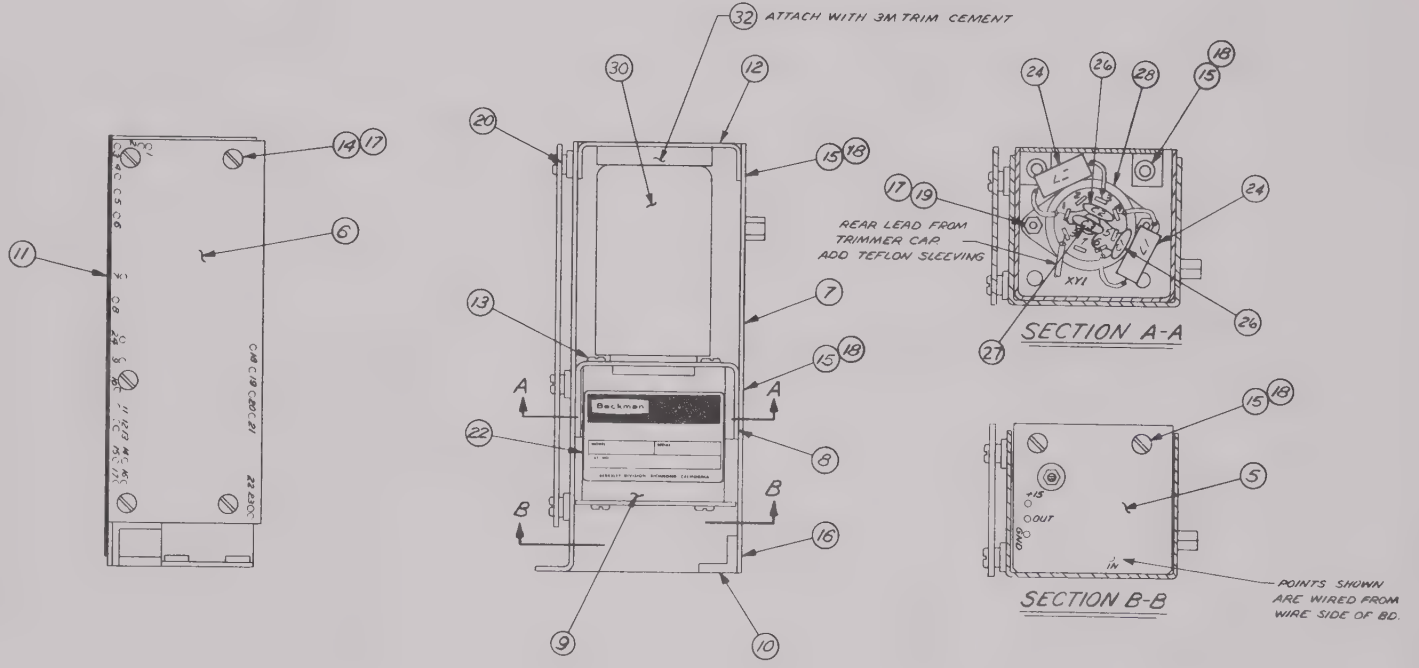
MULTIPLIER ASSEMBLY - PARTS LIST

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
	C855-437136-A	Multiplier Assembly	Beckman	
C1, 2, 4, 5, 12	633-836864	Capacitor, F. Cerm., 0.01μf, 50V, -20 +80%	Sprague C023B101-F103M	5
C3	633-804717	Capacitor, F. Cerm., 0.01μf, 500V	Aerovox BCD-D1-5-Z5U-103Z	1
C6	637-825335	Capacitor, F. Mica, 39pf, 500V, 5%	*DM15E390J0-500WV4CR	1
C7	637-822250	Capacitor, F. Mica, 620pf, 300V, 5%	DM15F621J0-300WV4CR	1
C8	637-825348	Capacitor, F. Mica, 300pf, 500V, 5%	DM15F301J0-500WV4CR	1
C9, 11	637-825104	Capacitor, F. Mica, 150pf, 500V, 5%	DM15F151J0-500WV4CR	2
C10	637-822769	Capacitor, F. Mica, 24pf, 500V, 5%	DM15C240J0-500WV4CR	1
C13	637-822909	Capacitor, F. Mica, 470pf, 500V, 5%	DM15F471J0-500WV4CR	1
C14, 16	637-822251	Capacitor, F. Mica, 100pf, 500V, 5%	DM15F101J0-500WV4CR	2
C15	637-825227	Capacitor, F. Mica, 5pf, 500V, 10%	DM15C050D0-500WV5CR	1
CR1	755-838731	Diode, 1N4448	Continental Devices	1
L1	795-435581	Inductor, Var., RF, Nom. 40-50μH	Beckman	1
L2, 3	795-435582	Inductor, Var., RF, Nom. 6μH	Beckman	2
L4, 5	795-435583	Inductor, Var., RF, Nom. 2-3μH	Beckman	2
Q1, 2	755-857274	Transistor, 2N4275	Fairchild	2
R1	601-822326	Resistor, 1.2K, 1/4W, 5%	**A.B. CB1225	1
R2	601-822299	Resistor, 6.8K, 1/4W, 5%	A.B. CB6825	1
R3	601-823383	Resistor, 22Ω, 1/4W, 5%	A.B. CB2205	1
R4	601-817735	Resistor, 100Ω, 1/4W, 5%	A.B. CB1015	1
R5	601-823394	Resistor, 330Ω, 1/4W, 5%	A.B. CB3315	1
R6, 8	601-822375	Resistor, 82Ω, 1/4W, 5%	A.B. CB8205	2
R7	601-823391	Resistor, 150Ω, 1/4W, 5%	A.B. CB1515	1
R9	601-823387	Resistor, 47Ω, 1/4W, 5%	A.B. CB4705	1
R10	601-822295	Resistor, 2.7K, 1/4W, 5%	A.B. CB2725	1
R11	601-823396	Resistor, 560Ω, 1/4W, 5%	A.B. CB5615	1
Z4, 5	885-857434	I.C., Dual 2 Input Gate	Fairchild 91429	2

* "DM15...." are Electromotive capacitors.

** "A.B." are Allen Bradley, fixed composition, resistors.

ZONE	REV	BY	DESCRIPTION	ECO No.	DATE	BY	CHK'D	APP'D
	B		ADDED C3	12143	7-17-68	L.W.		
	C		WAS 010-435639	12215	2-6-9	L.W.		



ITEM	PART NO	DESCRIPTION	QTY
		3M TRIM CEMENT	AS REQ
1	4037-435639	PARTS LIST, TIMING MODULE	1

UNLESS OTHERWISE SPECIFIED

TOLERANCES
X ± .050 ANGULAR ± 0° 30'
XX ± .020
XXX ± .005 MACH SURF ✓
THREADS CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES .020 MAX
MACH FILLET RADIUS .020 R MAX
MACH SURF FLAT WITHIN .001 IN IN
OTHER SURF FLAT WITHIN .005 IN IN
CONCENTRICITY MACH SURF TIR WITHIN ½ SUM OF DIA TOLS .001 MIN

DO NOT SCALE DRAWING

	BY	DATE
DRAWN	A. Shimada	6-67
CHKD	Ayling	7-67
ENGR	J. Hoey	7-67
APPD		
APPD		

TITLE: TIMING MODULE ASSY, AA

MATERIAL

FINISH

SCALE

SIZE: C

Beckman® INSTRUMENTS, INC.
ELECTRONIC INSTRUMENTS DIVISION

855-435640 C

SHEET 1 OF 1

REV

(6155) A8
(6148) A8

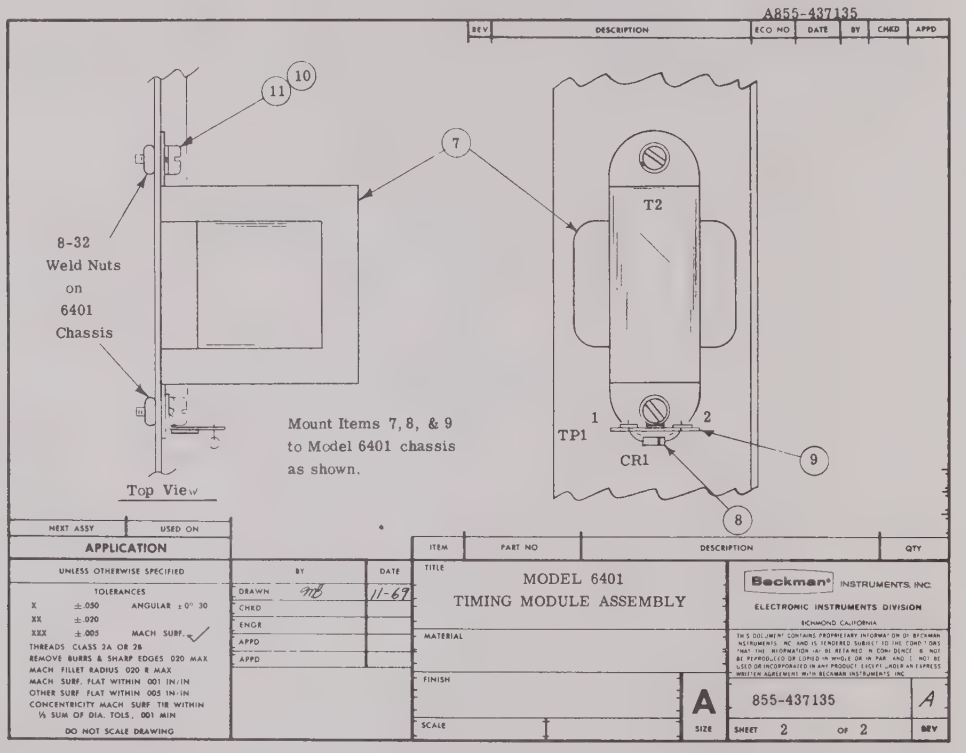
NEXT ASSY	USED ON
	6300

APPLICATION

C 010-435640 REV LTR

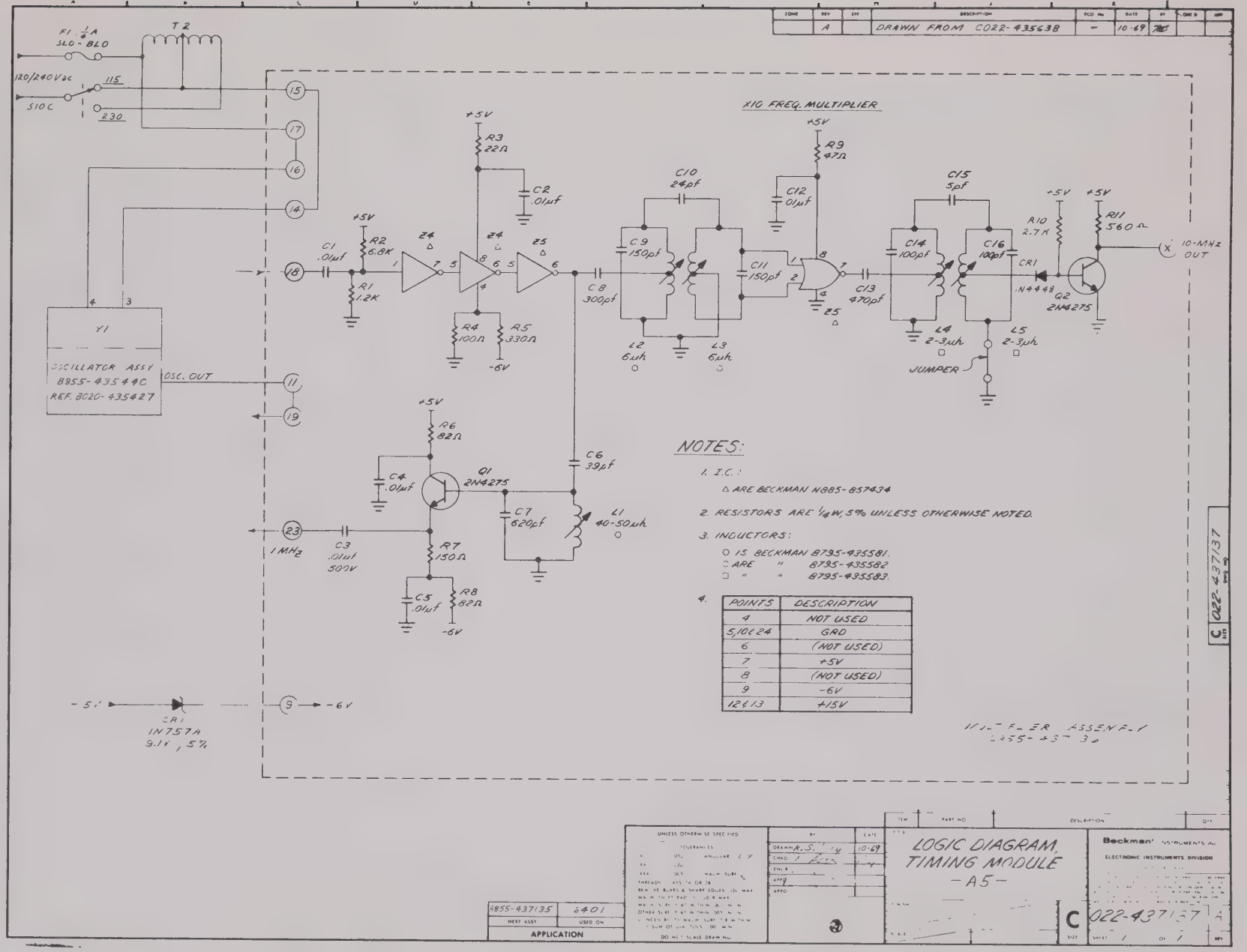
AA TIMING MODULE ASSEMBLY - PARTS LIST

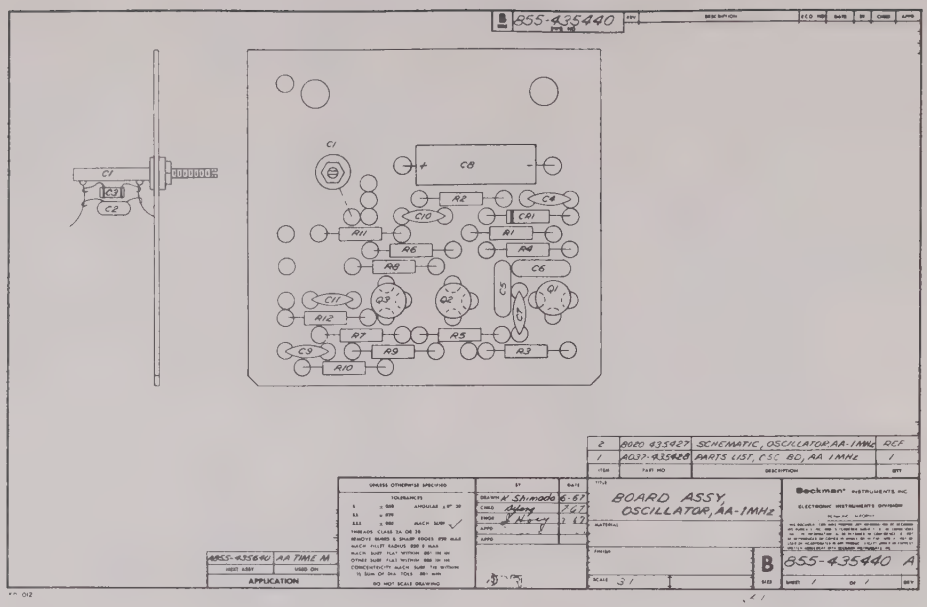
Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
	C-435640-C	AA Timing Module Assembly	Beckman	
C1, 2	633-804706	Capacitor, F. Cerm., 0.001μf, 20%, 1000WVDC	Centralab DD-102	2
C3	633-829336	Capacitor, F. Cerm., 0.1μf, 500V	Sprague 41C92	1
L1, 2	795-807919	Inductor, 470μH	Delevan 3500-24	2
XY1	860-042963	Socket, Octal	Cinch 101-24-10-067	1
Y1	881-430340	Crystal, 1 MHz	Beckman	1



TIMING MODULE ASSEMBLY - PARTS LIST

	A-437135-A	Timing Module Assembly	Beckman	
CR1	755-822923	Diode, Zener, 9.1 V, 1N757A	Texas Instruments	1
F1	731-015101	Fuse, 1/4A, Slo-Blo	Bussman MDL	1
T2	792-857559	Auto. Transformer	Knight "Allied" 54F2555	1
TP1	691-000506	Terminal Strip	Cinch Jones 332-11-03-028	1

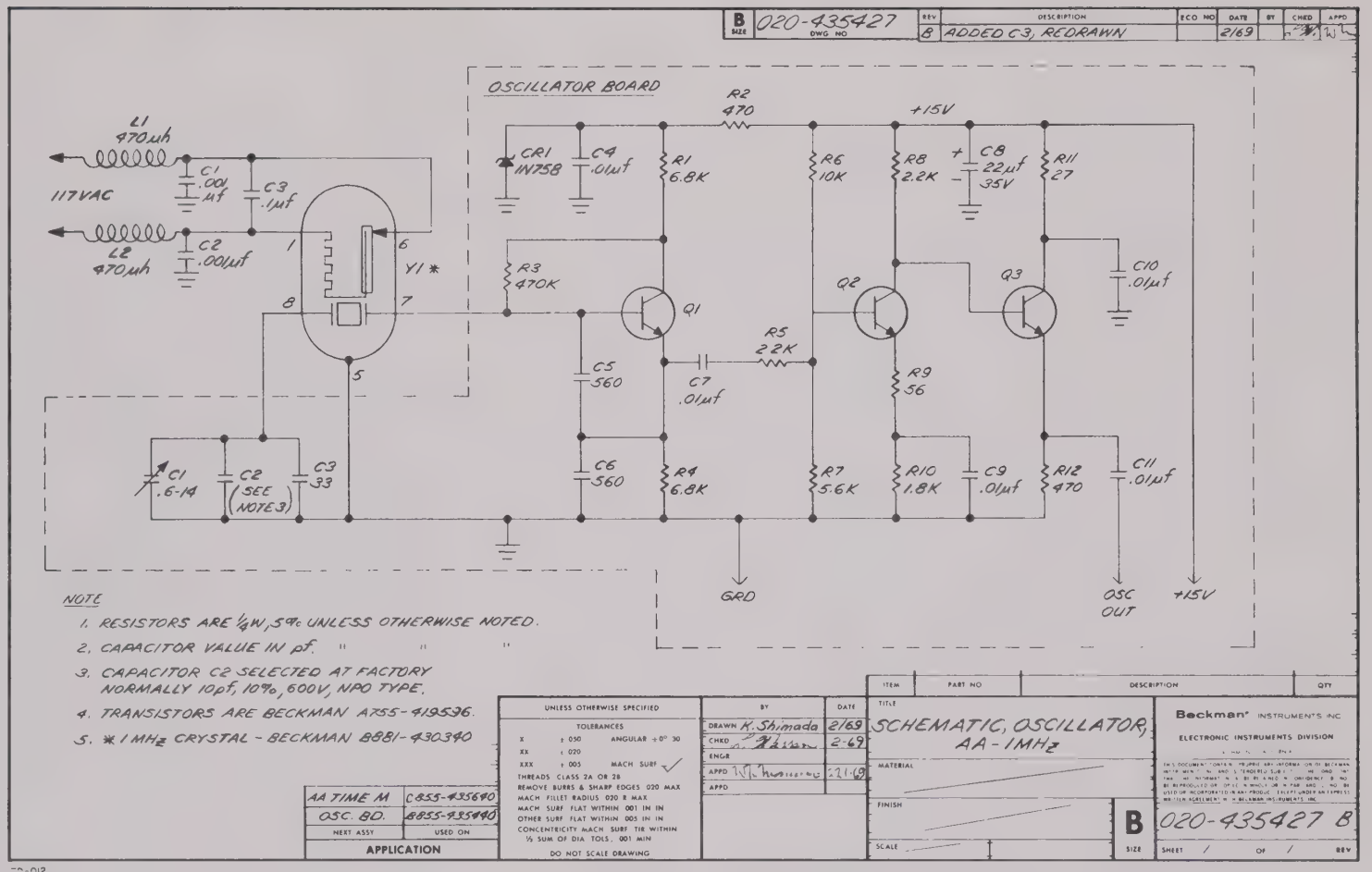

F1 1A SLO-BLO
T2
120/240Vac
115
230
S10C
X10 FREQ. MULTIPLIER
+5V
R3 22Ω
C2 .01μf
C1 .01μf
R2 6.8K
R1 1.2K
Z4
Z5
R4 100Ω
R5 330Ω
-6V
C10 24pf
C9 150pf
C11 150pf
L2 6μh
L3 6μh
R9 47Ω
C12 .01μf
C8 300pf
C13 470pf
C15 5pf
C14 100pf
C16 100pf
CR1 1N4448
R10 2.7K
R11 560Ω
Q2 2N4275
10-MHz OUT
L4 2-3μh
L5 2-3μh
JUMPER
Y1
OSCILLATOR ASSY B855-435440
REF. 8020-435427
OSC. OUT
R6 82Ω
C4 .01μf
Q1 2N4275
C6 39pf
C7 620pf
L1 40-50μh
1 MHz
C3 .01μf 500V
R7 150Ω
R8 82Ω
C5 .01μf
-5V
CR1 1N757A 9.1V, 5%
-6V
NOTES:
1. I.C.'s:
△ ARE BECKMAN N885-857434
2. RESISTORS ARE 1/8W, 5% UNLESS OTHERWISE NOTED.
3. INDUCTORS:
○ IS BECKMAN B795-435581.
△ ARE " B795-435582
□ " " B795-435583.
4.
POINTS | DESCRIPTION
4 | NOT USED
5,10 & 24 | GRD
6 | (NOT USED)
7 | +5V
8 | (NOT USED)
9 | -6V
12 & 13 | +15V
INTERFACER ASSEMBLY 8455-435730
ZONE | REV | DESCRIPTION | ECO No | DATE | BY
A | DRAWN FROM C022-435638 | — | 10-69
LOGIC DIAGRAM, TIMING MODULE -A5-
Beckman INSTRUMENTS, INC. ELECTRONIC INSTRUMENTS DIVISION
C022-437137
4855-437135 | 6401
NEXT ASSY | USED ON
APPLICATION
DRAWN K.S. 10-69
SIZE C



AA - 1 MHz OSCILLATOR BOARD ASSEMBLY - PARTS LIST

Detail No.	Beckman Part No.	Description	Typical Manufacturer & No.	Qty./ Assy.
	B-435440-A	AA-1MHz Oscillator Board Assembly	Beckman	
C1	655-824658	Capacitor, V, 6-14pf	JFD Electric VC11-GRA-DL	1
C2	637-xxxxxx	Capacitor, Factory Selected Value		1
C3	633-804671	Capacitor, F. Cerm., 33pf, 600V, 5%	Aerovox TCS12-NPO-330J	1
C4, 7, 9, 10, 11	633-836864	Capacitor, F. Cerm., 0.01μf, 50V, -20 +80%	Sprague C023B101F-103M	5
C5, 6	637-825349	Capacitor, F. Mica, 560pf, 300V, 5%	Electromotive DM15-F561J0-300WV4CR	2
C8	631-814054	Capacitor, F. Tant. 22μf, 35V, ±20%	Components Inc. TS3K-35-226	1
CR1	755-809734	Diode, Zener, 1N758	Texas Instruments	1
Q1, 2, 3	755-419596	Transistor, Special	Beckman	3
R1, 4	601-822299	Resistor, 6.8K, 1/4W, 5%	*A.B. CB6825	2
R2, 12	601-823395	Resistor, 470Ω, 1/4W, 5%	A.B. CB4715	2
R3	601-823912	Resistor, 470K, 1/4W, 5%	A.B. CB4745	1
R5, 8	601-822328	Resistor, 2.2K, 1/4W, 5%	A.B. CB2225	2
R6	601-822324	Resistor, 10K, 1/4W, 5%	A.B. CB1035	1
R7	601-823397	Resistor, 5.6K, 1/4W, 5%	A.B. CB5625	1
R9	601-823388	Resistor, 56Ω, 1/4W, 5%	A.B. CB5605	1
R10	601-822544	Resistor, 1.8K, 1/4W, 5%	A.B. CB1825	1
R11	601-823384	Resistor, 27Ω, 1/4W, 5%	A.B. CB2705	1

*"A.B." are Allen Bradley, fixed composition resistors.


B SIZE 020-435427 DWG NO
REV DESCRIPTION ECO NO DATE BY CHKD APPD
B ADDED C3, REDRAWN 2/69
OSCILLATOR BOARD
L1 470μh
L2 470μh
117VAC
C1 .001 μf
C2 .001μf
C3 .1μf
Y1 *
CR1 IN758
C4 .01μf
R1 6.8K
R2 470
R3 470K
Q1
C5 560
C6 560
C7 .01μf
R4 6.8K
R5 22K
R6 10K
R7 5.6K
Q2
R8 2.2K
R9 56
R10 1.8K
C8 22μf 35V
C9 .01μf
Q3
R11 27
R12 470
C10 .01μf
C11 .01μf
+15V
C1 .6-14
C2 (SEE NOTE 3)
C3 33
GRD
OSC OUT
+15V
NOTE
1. RESISTORS ARE 1/4W, 5% UNLESS OTHERWISE NOTED.
2. CAPACITOR VALUE IN pf. " " "
3. CAPACITOR C2 SELECTED AT FACTORY NORMALLY 10pf, 10%, 600V, NPO TYPE.
4. TRANSISTORS ARE BECKMAN A755-4195396.
5. * 1 MHz CRYSTAL - BECKMAN B881-430340
AA TIME M C855-435640
OSC. BD. B855-435440
NEXT ASSY USED ON
APPLICATION
UNLESS OTHERWISE SPECIFIED
TOLERANCES
X ± 050 ANGULAR ±0° 30
XX ± 020
XXX ± 005 MACH SURF ✓
THREADS CLASS 2A OR 2B
REMOVE BURRS & SHARP EDGES 020 MAX
MACH FILLET RADIUS 020 R MAX
MACH SURF FLAT WITHIN 001 IN IN
OTHER SURF FLAT WITHIN 005 IN IN
CONCENTRICITY MACH SURF TIR WITHIN 1/2 SUM OF DIA TOLS. 001 MIN
DO NOT SCALE DRAWING
BY DATE
DRAWN K. Shimada 2/69
CHKD 2-69
ENGR
APPD 2-21-69
APPD
ITEM PART NO DESCRIPTION QTY
TITLE SCHEMATIC, OSCILLATOR, AA-1MHz
MATERIAL
FINISH
SCALE
B SIZE
Beckman INSTRUMENTS INC
ELECTRONIC INSTRUMENTS DIVISION
020-435427 B
SHEET 1 OF 1 REV

E. I. D. CUSTOMER SERVICE

Beckman's commitment to you begins with the design and development of a product to fill your needs. This commitment continues through manufacturing, delivery, and your application of the finished product.

Your investment in a Beckman product brings the added benefits of Beckman Customer Service, which began operating on your behalf in the research, development, and design of your instrument, and continues serving you through the life of your instrument. Over 32 years of demonstrated product and service performance continues to build customer confidence and satisfaction with Beckman.

Beckman's service commitment to you is in recognition of the stringent and diverse demands which must be met by your instrument or system. The specified performance you purchased must be met every time you need it, when you need it . . . and for as long as you need it.

In a continuing program to bring Beckman service closer to you, we maintain three regional service and repair centers in the United States: Fullerton, California; Schiller Park, Illinois; and Mountainside, New Jersey. To further expand our service capabilities, district service repair centers are in full operation at Huntsville, Alabama; Albuquerque, New Mexico; Boston, Massachusetts; Timonium, Maryland; Houston, Texas; and Detroit, Michigan.

The following pages describe the basic facets of customer service, available to you as a valued Beckman customer:

- *Beckman Warranty*
- *Accurate Technical Information*
- *Useful Technical Training*
- *Installation and On-Site Service*
- *Factory Repair Service*
- *Replacement Parts*
- *Service Contracts*
- *Modifications/Expansions*

Beckman Warranty
Every standard instrument produced by Beckman Instruments, Inc., carries with it a warranty. A statement accompanies each shipment describing our warranty conditions in detail.

Your purchase of a Beckman instrument reflects your confidence in the quality, materials, workmanship, product performance, and responsive service record of Beckman. The Beckman warranty is our expression of confidence and commitment that your instrument will deliver the economy and excellence of use which you expect of each Beckman product.

Technical Literature
Technical data sheets are available to you on every Beckman instrument. You need information which is complete, accurate, useful in your terms, and which truly assists you in making the best decision in product selection. Beckman continues to set industry standards in this area of real benefit to you.

Operating and Service Manuals are supplied with each instrument, to provide theory of operation, operating instruction, maintenance/calibration procedures, and a tabulation of replaceable parts. These manuals are available in quantity . . . even for older instruments which promise to deliver required performance for many more years.

Service and Application Notes cover special maintenance procedures, modifications, or useful calibration techniques. Knowledge of the full scope of instrument applications will optimize your use of Beckman products. Your Beckman Service Representative will be pleased to offer this literature to you upon request.

REPLACEMENT PARTS

Inventories
The response time you must have on instrument maintenance, either in your laboratory or at Beckman, is directly dependent upon immediate access to the required parts inventory. We have placed this stock of replacement parts closer to you by implementing active inventories in each of our three regional service centers across the United States. Check Sections II, III, and IV of this Directory for the service office nearest to your facility.

Parts Identification and Ordering
Every Beckman service office retains complete technical files to help you identify required parts. You will find a tabulation of replacement parts in the manual delivered with your instrument or system. Every one of your Beckman Field Specialists is ready to offer further assistance at any time.

Delivery
A replacement part is a critical item. Your request or order is filled the same day that it is received at the point where the part is stocked. A parts order which cannot be satisfied in five days or less will result in immediate notification to you with a statement of best delivery. You can depend on most parts orders being filled and shipped the day received.

When ordering a supply or replacement item, listing the Beckman stock number and its generic title as shown in your Operating and Service Manual will expedite the handling of your order.

REPAIR SERVICE

Factory Repair Service
Complete factory repair capability is maintained at each of our manufacturing facilities, covering every instrument and system on our product list. Factory Repair Centers for E.I.D. are as follows:

Richmond Products

Beckman Instruments, Inc.
Electronic Instruments Division
2200 Wright Avenue
Richmond, California 94804
Attention: Factory Service Manager

Schiller Park Products

Beckman Instruments, Inc.
Electronic Instruments Division
P.O. Box 66204
Chicago, Illinois 60666
Attention: Factory Service Manager

Fullerton Products

Beckman Instruments, Inc.
Electronic Instruments Division
2400 Harbor Boulevard
Fullerton, California 92634
Attention: Factory Service Manager

Regional Repair Capability
We have established and staffed regional repair centers at Fullerton, California; Schiller Park, Illinois; and Mountainside, New Jersey, to supplement our factory repair service. Complete repair facilities up to major overhaul and refurbishment are maintained at each regional service center. We feel that this type of service will prove to be a genuine benefit and will bring Beckman Service closer to our customers.

On-Site Repair Service

Beckman service specialists are factory-trained and equipped to effect many maintenance or repair actions right where your instrument is located—with *no* disruption to your operating schedules. Your timely use of this service can significantly reduce subsequent repair bills and costly "down time."

Equipment and Personnel Standards

We are directing our entire effort toward a single objective—your satisfaction. Design and equipment excellence must be matched by similar excellence of our personnel working with you. To that end, we sustain a continuous and formal program of equipment, calibration, inspection, and personnel improvement. Your inputs help us to meet our objectives!

BECKMAN TOTAL SERVICE

The Electronic Instruments Division of Beckman Instruments, Inc., currently provides contract service on an annual, fixed-price basis to many customers. These clients have found both time and dollar economies are maximized in their operation when served by a Beckman Service Contract.

Beckman has successfully performed under this formal program for over eight years. Many clients have renewed these contracts year after year because it saved them money while maximizing continuous and efficient performance of their equipment.

With a planned investment in a Beckman *TOTAL SERVICE* Contract, you insure that your instruments are delivering optimum performance at all times. Some of our clients claim to have saved or made more money under a Beckman Service Contract than the original purchase price of the equipment. It's hard to beat that kind of economy.

A BECKMAN *TOTAL SERVICE* AGREEMENT provides:

- *Regular check-ups to insure proper operation.*
- *Coordination with your personnel to solve instrument or system problems.*
- *Refresher training for your operators.*
- *Emergency service consultation or calls.*
- *Parts replacement.*
- *Factory repair.*
- *System or instrument optimization twice a year, where all parts are checked for marginal operation; identification of aging components or sub-assemblies; tests are conducted to establish that the product meets or exceeds its original, as installed, accuracy specification; and a written statement is provided indicating that the product meets or exceeds its original accuracy specification.*

A BECKMAN MAINTENANCE SERVICE CONTRACT provides:

- *Beckman factory-trained field specialist(s) at your facility to conduct required training, maintenance and/or operation of your Beckman equipment.*
- *Services available to meet your requirements include all emergency repair service; on-call 24 hours; all maintenance and calibration; parts expediting and installation; factory repair expediting; modifications and refurbishment assistance; continuous optimization of instrument or system performance; and creating or up-grading software programs.*

Beckman's Service Contract performance is of field-proven benefit to you. Extensive data is available to you which demonstrates direct savings and other performance values. Beckman Service improves the usefulness and efficiency of each instrument or system purchased from Beckman throughout the entire life of the product.

POINTS OF CONTACT

Your Location	For Service, Call or Write:
Maine New Hampshire Vermont Massachusetts Connecticut Rhode Island	Beckman Instruments, Inc. Electronic Instruments Division 599 North Avenue Wakefield, Massachusetts 01880 Phone: (617) 245-6800 Attention: Service Manager
New York New Jersey Maryland Virginia West Virginia Washington, D.C.	Beckman Instruments, Inc. Electronic Instruments Division Route 22, Summit Road Mountainside, New Jersey 07092 Phone: (201) 232-7600 Attention: Service Manager
Tennessee North Carolina South Carolina Mississippi Alabama Georgia Florida	Beckman Instruments, Inc. Electronic Instruments Division 4306 Governors Drive, Suite R Huntsville, Alabama 35805 Phone: (205) 881-2383 Attention: Service Manager
North Dakota South Dakota Minnesota Wisconsin Nebraska Iowa Kansas Missouri Illinois Michigan Indiana Ohio Pennsylvania Kentucky	Beckman Instruments, Inc. Electronic Instruments Division P. O. Box 66204 Chicago, Illinois 60666 Phone: (312) 678-6225 Attention: Service Manager
Oklahoma Arkansas Texas Louisiana	Beckman Instruments, Inc. Electronic Instruments Division 5810 Hillcroft Avenue Houston, Texas 77036 Phone: (713) 781-0810 Attention: Service Manager
Montana Idaho Wyoming Utah Colorado Arizona New Mexico	Beckman Instruments, Inc. Electronic Instruments Division 4200-D Silver Avenue, S.E. Albuquerque, New Mexico 87108 Phone: (505) 265-8511 Attention: Service Manager
Washington Oregon Northern Nevada Northern California	Beckman Instruments, Inc. Electronic Instruments Division 2200 Wright Avenue Richmond, California 94804 Phone: (415) 526-7730 Attention: Service Manager
Southern California Southern Nevada	Beckman Instruments, Inc. Electronic Instruments Division 2400 Harbor Boulevard Fullerton, California 92634 Phone: (213) 691-0841 Attention: Service Manager

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